

**MEGA-PROJECT PLANNING AND ECONOMIC WELFARE:
A CASE STUDY OF BRITISH COLUMBIA'S NORTH EAST COAL PROJECT**

By

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ABSTRACT

This research investigates the characteristics of natural resource mega-project planning processes. The implications of staple theory and selected characteristics of natural resource mega-projects are used to construct eleven characteristics of such planning processes. Staple theory suggests that optimistic expectations will be a fundamental characteristic of resource development planning in Canada, and that the state's role will be to facilitate, rather than evaluate, staple production. The size, complexity, visibility, and meaning of mega-projects may create momentum around them that weakens rational analysis and stampedes the planning process. Overall, the planning process may focus on narrow, technical issues concerned with constraints facing the mega-project. Alternatives may not be considered, overly optimistic expectations may not be checked, and risk and uncertainty may be inadequately addressed.

These proposed planning process characteristics are investigated in a case study of British Columbia's North East Coal Project (NECP). The institutional structure of the planning and implementing organizations are investigated, and the major planning issues are identified. The expectations generated within the planning process regarding the mega-project's contribution to regional economic growth and development, and its economic viability are reviewed, and then evaluated by comparing them to information available at the time from sources within the planning process and from sources outside the planning process, and to actual outcomes.

The case study findings support many of the eleven proposed characteristics of natural resource mega-project planning processes. The NECP's public planning process focused on identifying and overcoming constraints that would prevent the mega-project proceeding, and on minimizing the costs of the public sector's infrastructure responsibilities in the mega-project. The terms of reference for the various Sub-Committees requested analyses

of constraints in most cases. The absence of a Regional Development Sub-Committee in the organization of the planning task force suggests that longer term planning issues were not perceived to be as important as the infrastructure issues. Sixty percent of the official public planning budget was allocated to transportation and townsite studies. The mandate, structure and operations of the government's implementing organization focused on controlling project costs. Finally, the benefit-cost analysis of the mega-project did not consider any alternatives to the NECP.

The expectations regarding the NECP's contribution to regional economic growth and development were overly optimistic given the information available at the time, and far exceed the actual outcomes to date. The NECP stabilized the South Peace region during the recession of the early 1980s, and produced some growth in employment, population, and income levels. Also, education levels increased and some entrepreneurial development occurred. However, the mega-project did not alleviate the unemployment situation in the region, did not improve the distribution of income, and it did not diversify the regional economic structure. Despite the early planning emphasis given to the opportunities that the NECP could provide to members of regional target groups such as Natives and women, few individuals from these groups obtained mining employment. In 1986, most of the direct economic benefits associated with the NECP, such as the new employment opportunities, high incomes, and training opportunities, had been captured by in-migrants to the region.

The expectations regarding the NECP's economic viability were also overly optimistic given information available at the time. The possibility of capital cost overruns were not considered despite ample indication that they were highly probable. Continuing high prices were assumed despite historical evidence that periods of high prices had been consistently followed by sustained periods of low prices, and expert advice that structural forces would

contribute to a continual decline in the Japanese demand for metallurgical coal. The pre-project analysis projected that the NECP's net present value would be \$464 million (1980\$C), but the *ex post* analysis suggests that the NECP will generate \$955 million (1980\$C) in net economic losses for the Canadian economy.

The overly optimistic expectations regarding the NECP's economic viability were formed early in the planning process and were based on a period of enormous increases in metallurgical coal prices. As market conditions changed, the group within the planning task force responsible for the NECP's economic evaluation lowered their expectations, but their concerns were apparently insufficient to counter the momentum that had been established around the NECP. This momentum was reinforced by the meaning attached to the NECP, which was portrayed as a fundamental component of BC's economic development strategy.

Risk and uncertainty were inadequately addressed within the planning process and within the technical analyses of this mega-project's regional economic impacts and economic viability. No sensitivity analyses were completed in the analysis of the NECP's regional economic impacts. The sensitivity analyses in the pre-project benefit-cost analysis all considered positive adjustments to the base case scenario, save one. Problems of geological uncertainty, and the lack of experience of the project proponents in coal mining were ignored.

Mega-project planning processes must be carefully designed to counter the characteristics suggested by this research. At a minimum, a full public review of the mega-project should be conducted before the decision to proceed is taken. Consideration should be given to developing a formal, required mega-project planning process based on the two-tiered structure. The first tier would include a policy assessment addressing broad questions

such as alternative regional development strategies. If the outcome of the first tier was a decision to proceed with a mega-project, the second tier would address mega-project planning and regulatory issues such as infrastructure options and impact management strategies.

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GLOSSARY

1980\$C	1980 Canadian dollars
1980\$US	1980 United States dollars
BC	British Columbia
BCR	British Columbia Railway
BOC	Bullmoose Operating Corporation
CNR	Canadian National Railway
EIA	Environmental Impact Assessment
ECC	Economic Council of Canada
FOB	Free on Board
IEA	International Energy Agency
JSI	Japanese Steel Industry
MMT	Million Metric Tonnes
MMTPY	Million Metric Tonnes Per Year
NECDO	North East Coal Development Organization/Office
NECP	North East Coal Project
NHB	National Harbours Board
QCL	Quintette Coal Limited
RTNAS	Rio Tinto North American Services Ltd.
SEBJ	Societe d'Energie de la Baie James
SRI	Stanford Research Institute
UBC	University of British Columbia

CHAPTER ONE

INTRODUCTION

Natural resource mega-projects are some of the largest investments undertaken in Canada. They have been used as a policy approach to regional economic development, and have tremendous technological, political, and emotional appeal. Further, mega-projects are persistent and tend to appear and re-appear on the Canadian economic scene. Yet they are very complex undertakings and are surrounded by uncertainty. Taken together, these factors suggest it is imperative that we improve our understanding of natural resource mega-projects.

This research suggests that the characteristics of natural resource mega-projects, combined with the staple mentality that permeates resource development planning in Canada, may create problems in the planning process. The size and symbolic meaning of the mega-project, supported by the formation of overly optimistic expectations regarding the potential contribution of natural resources to regional economic development, may weaken rational analysis and stampede the planning process. The planning process may focus on facilitating the mega-project, rather than evaluating it. Insufficient planning attention may be directed towards problem definition or alternative generation, and the process may become focused on maximizing short-term benefits and minimizing short-term costs. The risk and uncertainty associated with mega-projects may be systematically understated which may result in a 'great planning disaster' (Hall 1980), where enormous public resources are committed to a policy or project that does not achieve its objectives.

In the case examined here, the public planning process, during its analysis and evaluation phase, focused on identifying the most efficient set of infrastructure investments to support the private sector components of the mega-project. The planning task force did not

consider prior questions, such as potential alternatives to the mega-project. It was implicitly assumed that by providing infrastructure support for the mega-project, the government was developing the region. For example, there was no Regional Development Sub-Committee within the planning task force, yet there were Sub-Committees for Transportation and for the Townsite. This focus was reinforced by the great technical challenges presented by the mega-project, especially in its infrastructure components. Planning focused on resolving these issues, and the role of experts within the process was consequently amplified. No procedural arrangements were made to facilitate the participation of regional representatives or the general public in the analysis and evaluation phase of the planning process.

Momentum built around the mega-project and within the planning process, and high expectations were formed regarding the contribution of the mega-project to regional economic development. The risk and uncertainty surrounding the mega-project, which grew as external conditions changed, were understated. The questionable economic viability of the mega-project was apparently insufficient to prevent the project from proceeding. In the implementation phase of the planning process, the government's major concerns were project management and impact mitigation. The enormous challenges presented by building such a complex project on time and on budget may have diverted planning attention away from the government's other objectives of regional hiring and procurement.

Given the high probability that mega-projects will continue to be developed in Canada, more research is required to determine whether the characteristics of mega-project planning processes observed in this case are supported by other cases. If similar findings emerge, new designs for mega-project planning processes will be required to counter the problems, improve the contribution of these projects to regional economic development, and

prevent great planning disasters. Over the long term, these new designs could also lessen the influence of a staple mentality in resource and economic development planning.

1.1 RESEARCH PROBLEM

Context

In 1981 the federal government announced its long-term economic development strategy based on natural resource mega-projects. The national economic strategy integrated the cumulative strategies of the private and public sectors across Canada that were formulated during the 1970s, a time of unprecedented energy price increases. Not surprisingly, the majority of the mega-projects were in the energy sector and many involved the application of new technology at a pioneering scale, often in frontier locations.

The magnitude of the mega-projects detailed in the economic strategy was stunning, with planned investments over the last two decades of the 1900s totalling \$440 billion (Canada 1981b). The expectations attached to the mega-project strategy were equally grand. According to the federal government's analysis, mega-projects offered enormous opportunities for national economic growth and linked industry development (Canada 1981b). In addition, mega-projects promised to make significant contributions to regional economic development, a central concern of Canadian politics. The federal Minister of Industry said

The development of major projects can play a critical role in fostering regional economic diversification, enhanced economic growth and industrial restructuring in Canada. (quoted in Boothroyd 1981, 66).

Like their federal counterparts, provincial politicians were also swept up by the promise of the mega-project strategy. Higher provincial tax revenues and general economic buoyancy

were anticipated outcomes of the mega-project investments. Regional development was expected to follow naturally from the mega-projects' locations outside provincial metropolitan centres. In addition, the mega-project investments suggested a shift in the balance of national economic power away from central Canada in favour of provinces and territories traditionally on the fringe of the Canadian political economy. In the early 1980s, natural resource mega-projects were being seriously examined by provincial governments from coast to coast.

The unique, massive and complex nature of mega-projects required new public planning processes to deal with the myriad of issues these projects stimulated (Sewell 1987), and during the 1970s and early 1980s, new approaches were emerging. O'Riordan (1984) grouped these planning approaches into three categories; creation of project-specific inquiries, extension of existing regulatory systems to address additional concerns, and creation of new institutional arrangements. None of these innovations have been completely and consistently effective or efficient in planning mega-projects. Common criticisms are that uncertainty is inadequately addressed, that the decision to proceed is therefore often based on inadequate information or questionable assumptions, and that the planning process does not place the mega-project in a broader policy framework (O'Riordan 1984; Sewell 1987; Rees 1980a; Rees 1984a; Rees 1989; Marshall et al. 1986; Sadler 1990).

After a temporary slowdown associated with the recession of the early 1980s, the pace of resource mega-project development is again accelerating. Plans are underway for construction of the second phase of Quebec's James Bay hydroelectric complex, the Conawapa dam in Manitoba, and the Site C dam in British Columbia. Several oil-sands mega-projects in Alberta and the Hibernia project in Newfoundland have recently received government financial support, and the stage is apparently set for a northern pipeline.

Given this renewed emphasis, additional research on natural resource mega-project planning processes is required. The findings could make an important contribution to the design of future mega-project planning processes that could improve the contribution of natural resource mega-projects to regional economic development.

Problem Statement

A favoured approach to mega-project planning in Canada has been to adapt existing regulatory processes to the project, often by broadening the terms of reference for environmental impact assessments and associated review panels and public hearings. In northern Canada, the federal government's environmental assessment and review process (EARP) has been applied to a number of mega-projects, and in most cases the issues at stake required more from the process than a project-oriented environmental impact assessment. For example, the terms of reference given to the panel responsible for the Beaufort Sea EARP were very broad, requesting an impact assessment of the development concept of northern hydrocarbon exploitation rather than a specific hydrocarbon project (Rees 1984a).

The large role of environmental impact assessment (EIA) and environmental concerns in mega-project planning processes is not surprising given the enormity of these projects' potential impacts and the public's environmental consciousness (Sewell 1987). As a result of EIA's prominent role, researchers and participants have concentrated on evaluating the existing or modified EIA processes, and have made recommendations for further adaptations and improvements in this important aspect of the planning process (Boothroyd and Rees 1984; Rees 1984a).¹ The research on EIA processes is action-based, innovative,

¹ The recommendations have included strengthening procedural elements within EIA processes (Rees 1980a), establishing monitoring programs (Krawetz et al. 1987), instituting more community-based impact assessment, monitoring and management (Rees 1989), establishing frameworks for cumulative impact assessment (Sonntag et al. 1987),

and at the leading edge of the field (Marshall et al. 1986). In terms of its contribution to research on mega-project planning processes, however, two issues emerge. First, due to the large role of impact assessment, existing research is focused overwhelmingly on analyzing this aspect of the mega-project planning process. Thus, while several authors have noted the inherent limitations of EIA in addressing the broader issues raised by a mega-project (Rees 1984a; O'Riordan and Sewell 1981; Sadler 1990), systematic theoretical or empirical explorations of the characteristics of more comprehensive mega-project planning processes is lacking. This limits the potential contribution of existing research to the design of future mega-project planning processes. Second, existing research has consistently pointed to the lack of *ex post* analyses of mega-projects' socio-economic impacts. Clearly, *ex post* analyses are crucial to improving our expectations regarding these impacts and any planning efforts that might be directed towards them. This research addresses these issues by using a fresh theoretical perspective in a systematic examination of a comprehensive planning process for a natural resource mega-project, and by completing an *ex post* analysis of the mega-project's impacts on regional economic development.

Another perspective on mega-project planning processes is provided by staple theory and related writings in Canadian political economy. In that literature, a number of authors have pointed to the difficulties created by relying on natural resources in an economic development strategy, particularly when resource exploitation involves capital-intensive technologies (Innis 1930; Mackintosh 1939; Watkins 1963; Richards and Pratt 1979; Gunton and Richards 1987). These difficulties include:

improving procedural elements for incorporating scientific information (Marshall et al. 1986), improving the form and nature of public participation (Canada 1988), and integrating EIA more completely into project design and community development planning (Boothroyd and Rees 1984).

- 1) dependence on volatile export demand that is beyond regional control,
- 2) the tendency for capital intensive, 'lumpy' investments to create economic rigidities that are keenly felt when the high fixed debt servicing charges are combined with the volatile and uncertain revenue flows,
- 3) generation of a 'staple mentality' which causes resources to be invested in uneconomic staple expansion, and
- 4) the potential for a 'staple trap' to emerge where the economy becomes dependent on a narrow resource base that is vulnerable to exogenous factors and subject to decline once the resource base is exhausted or when structural shifts in demand occur.

This literature raises a number of substantive concerns that should be addressed in a planning process, but this research focuses on the implications of a staple mentality for natural resource mega-project planning processes.

Staple theory suggests that, in economies dominated by resource extraction and export, there is a tendency for a staple mentality to develop that places excessive, and often unwarranted, emphasis on the natural resource sector in the economy. As Canada's leading economic historian Harold Innis observed:

Energy has been directed toward the exploitation of staple products and the tendency has been cumulative ... Energy in the colony was drawn into the production of the staple commodity both directly and indirectly. Population was involved directly in the production of the staple and indirectly in the production of facilities promoting production. Agriculture, industry, transportation, trade, finance, and governmental activities tend to become subordinate to the production of the staple for a more highly specialized manufacturing community. (Innis 1930, 385).

The dynamics of the staple mentality's development and persistence in Canada are complex. A key variable, however, is the expectations formed by staple sector participants. Theorists have argued that the staple mentality is consistently supported by the formation of overly optimistic expectations regarding the potential contribution of

resources to regional economic development (Gunton and Richards 1987). The predisposition towards overly optimistic expectations formation is rooted in the historical and cultural circumstances of Canadian economic development, such as the particular roles of foreign versus domestic entrepreneurship. When combined with certain characteristics of mega-projects, such as their size and uncertainty, the staple mentality and the dynamics supporting it may produce significant biases within the planning process, such as a focus on identifying the constraints facing the mega-project rather than a more fundamental analysis of the planning problem.

The questions addressed in this research are:

- 1) what are the implications of the staple mentality for resource development planning processes in Canada;
- 2) what are the characteristics of natural resource mega-projects that could have an important influence on the planning process;
- 3) how might the selected characteristics of mega-projects interact with the characteristics of resource development planning processes to affect the planning process, particularly the expectations generated within the process regarding the regional economic development impacts;
- 4) how reasonable are these expectations and how do they compare to actual outcomes; and
- 5) what are the implications of the research findings for the design of mega-project planning processes.

In British Columbia, the North East Coal Project (NECP) is a natural resource mega-project that was planned and implemented using an elaborate, specially-designed, public planning process. A federal-provincial planning task force was created with six Sub-Committees that examined questions related to the coal resource, coal transportation,

environment and land use impacts, manpower supply, townsite and community development requirements, and coal economics, finance and marketing. This approach attempted to provide a comprehensive analysis of a broad range of planning issues.

The NECP is the largest single industrial undertaking in the history of BC, and the planning process was one of the most ambitious ever undertaken in Canada. The public planning process spanned an eight year period (1976-1983) and consumed over \$13 million. The provincial and federal governments were involved in this joint planning effort to "... ensure that as the development proceeds the people of BC and Canada will receive the greatest possible benefits and minimal adverse impacts." (BC 1981a, 3). The NECP was completed in 1983 and has been in operation for seven years; it provides an excellent opportunity to conduct further research on planning processes for natural resource mega-projects, and their regional economic development impacts.

1.2 PURPOSE AND OBJECTIVES

The research purpose is to investigate the potential influence of a staple mentality and selected characteristics of natural resource mega-projects on the public planning process. The investigation focuses on the formulation and analysis components of the planning process,² and the expectations generated regarding the mega-project's regional economic development impacts and economic viability. These expectations are elucidated by reviewing the relevant technical analyses of the mega-project and identifying the key assumptions underpinning these analyses.

² The formulation and analysis components of the planning process consist of problem or goal identification, alternative generation, and alternative analysis and evaluation.

The research objectives are:

- 1) to review, from the literature, the mechanisms underpinning a staple mentality and its influence on resource-related planning and policy-making in Canada;
- 2) to review, from the literature, characteristics of natural resource mega-projects that may affect the planning process;
- 3) to analyze how the characteristics of natural resource mega-projects and the staple mentality might affect a natural resource mega-project planning process;
- 4) to investigate the characteristics of the planning process for the NECP, focusing on the formulation and analysis components of the process;
- 5) to identify and evaluate the expectations formed within the planning process regarding the mega-project's regional economic development impacts and economic viability; and,
- 6) to elaborate the implications of the research findings for the design of mega-project planning processes.

1.3 STUDY METHODS

The research method consists of:

- 1) a literature review of
 - a) staple theory and related writings in Canadian political economy to explore the origin, evolution and dynamics of a staple mentality, and its influence on resource development planning in Canada, and
 - b) Canadian natural resource mega-projects to identify selected major characteristics,
- 2) based on the literature reviews, development of research questions regarding general characteristics of planning processes for natural resource mega-projects,

- 3) a case study analysis of the planning process for BC's NECP, comprised of
- a) a description of the policy context for this mega-project,
 - b) a history of the mega-project,
 - c) a comprehensive description of the planning process focusing on problem formulation and analysis, first at an overall level in the planning process, and then within the regional development planning and economic evaluation aspects of the process. The description includes the process's institutional structure, its purpose and objectives, the terms of reference for various planning committees, the planning problems identified, alternatives examined and recommendations made, resource allocation within the process, the timing of decisions, and the relationship of the planning process to external events, and
 - d) an evaluation of the expectations generated within the planning process regarding the NECP's regional economic development impacts and economic viability. The assumptions contained in the relevant technical analyses are evaluated by comparing them to other information available at the time, and to actual outcomes. Other information available at the time is divided into two sources; from inside the institutional framework of the planning process (i.e. from the expert consultants) and from outside the planning process (i.e. from the critics and from other published information). The actual outcomes are assessed by completing a comprehensive *ex post* regional economic impact analysis, and an *ex post* benefit-cost analysis.

Data Sources and Specific Methods

To identify selected characteristics of natural resource mega-projects, data sources include newspaper reports, popular articles on mega-projects, government reports, and documents from project proponents. In addition, academic analyses of mega-projects are utilized.

The project history covers the period from 1970 to the present, and data sources include newspapers and periodicals, and other published descriptions and analyses of the planning process. The description of the planning process relies primarily on government reports prepared within the NECP planning process, which are supplemented with other published analyses in popular and academic literature.

The evaluation of the assumptions contained in the technical analyses of the NECP's regional economic development impacts and its economic viability draws on information available at the time from inside and outside the planning process. The information provided directly to the planning process is contained in background documents prepared by government departments or consultants; all available documents are critically reviewed and summarized, and the advice contained in these documents is compared to the assumptions used in the planning process. The information available from outside the process is divided into information from critics of the project, and other published evidence regarding the issues being dealt with in the planning process. These documents are summarized and compared to the assumptions used in the planning process.

The expectations raised in the planning process are also evaluated by assessing the mega-project's actual impacts on regional economic development between 1981 and 1986, and its current economic viability. The *ex post* analysis of regional economic development impacts focuses on the South Peace region in northeastern BC and is comprised of:

- a) analysis of Census data for changes in selected indicators over the 1981 - 1986 time period; this analysis examines temporal changes at the regional level, and then disaggregates these changes to examine their distributional effects, focusing on regional residents, in-migrants and target groups (specially ordered cross-tabulations of Census data are required for the distributional analysis); and
- b) analysis of interviews with key regional informants regarding their perceptions of the regional and community economic development impacts, positive and negative, of the NECP.

The assessment of the NECP's current economic viability uses an *ex post* benefit-cost analysis which follows the methodology of the pre-project analysis but uses actual cost and revenue data wherever possible. Data sources include published analyses of coal markets, prices and costs of production, and publicly available estimates of costs for other components of the NECP.

1.4 SCOPE AND DEFINITIONS

The research scope is limited in several ways. First, the normative concern driving this research is the improvement of the contribution of natural resource exploitation to regional economic development in Canada. Thus, the research does not address the arguments on the role of resources versus manufacturing in economic development that dominate many discussions of Canadian economic development policy (Copithorne 1979; Richards 1985). I believe that natural resource exploitation will continue to play a major role in Canadian economic development, particularly in the West and the North, and that improvements in the contribution of this type of economic activity to regional economic development are possible.

Second, this research does not address the emerging arguments regarding the links between resource exploitation and sustainable development. I believe that society's broad goals will evolve slowly towards sustainable development, but that growth will continue to be a central objective in Canadian society for the medium term and that resource exploitation will be perceived as a major means of achieving growth. However, the findings of this research may be relevant to the sustainable development debate.

Finally, this research is a macro-level analysis of a technically-oriented planning process, investigating how the public planning problem was defined and how information and technical analyses were used to examine this problem. This focus provides valuable insights into the expectations surrounding the mega-project. This research does not examine the influence of micro-level factors, such as bureaucratic politics or personality conflicts, on the planning process. While not discounting the potential importance of these factors in influencing planning processes, the broader focus is appropriate to the case study. The NECP's planning process was designed to be a rational-comprehensive process, and placed its major emphasis on technical analyses of the planning problems presented by this mega-project. Examining this process from a similar perspective is reasonable.

In the broadest sense, planning and policy making have been used to denote rational choice aimed at bringing about some state of the world consistent with a predetermined collective end (Payne 1987). Innis de Neufville (1986) defines planning as a set of activities intended to improve the quality of decisions for a community and help prepare for its future. This definition appears to separate planning from implementation and monitoring. There is now fairly widespread recognition that separation of these activities conceptually or organizationally is unwise (Mintzberg and Jorgenson 1987), and Innis de Neufville's definition would be improved by including these activities. Perhaps the definition should be

rephrased slightly to say, planning is a set of activities designed to improve the quality and outcomes of a community's decisions, and to help prepare for its future.

The set of activities making up planning was traditionally argued to be primarily technical analysis of problems or alternatives, but communicative activities such as negotiation, mediation, and social learning are increasingly being accepted as planning activities (Forester 1989). Clearly, planning involves applying knowledge to solve a socially-defined problem or to meet a socially-defined goal, and is underpinned by some positive purpose to change the future. The planner's role in the process may include assisting a community to define social goals or problems, preparing and analyzing alternative solutions, and/or implementing a chosen strategy.

Planning takes place within a social and organizational context, and elements of planning theory address how the 'ideal' rational-comprehensive model (comprised of problem/goal identification, alternative generation, evaluation, choice, implementation, monitoring and feedback) is affected by its contextual setting. Lindblom (1959) argued incrementalism is a more apt description of how policy and planning processes work, and his work encouraged planning theorists to apply theories of political science in their analyses of planning processes. For example, the role of interest groups in affecting goal or problem definition, alternative generation and choice has been examined, as has the role of bureaucrats in implementation. Gunton and Richards (1987) argued that Olson's (1982) model of concentrated benefits and diffused costs is useful in interpreting and understanding the dynamics of the policy-making and planning processes in the Canadian resource sectors.

The incrementalists' description of planning and policy-making as a drifting, muddling activity has been criticized. Mintzberg and Jorgensen (1987) and others (Doern and Phidd 1983) have argued that there is a subtle order within the process.

Surely there is more to the process than the leaping from crisis to crisis, or the randomness of mutual adjustment. Can these be any more than caricatures of the policy-making process? ... Surely something has been driving that process. Some may prefer to call it ideology, or bureaucratic momentum, or group think, but that consistency is captured neither by the traditional models of rationality nor by the contemporary ones of politics and incrementalism. (Mintzberg and Jorgensen 1987, 218).

Many planning theorists use Marxist theory to examine the role of ideology in the planning process, and argue that broad structural forces are very important in affecting the definition of problems or goals and in the consideration of alternatives. Staple theory provides useful insights into the structural forces operating in Canadian resource policy-making and planning. Gunton and Richards (1987) argued that a staple mentality may fundamentally limit the range of choices or alternatives considered in resource planning. This research explores the working hypothesis that, in the area of resource development planning in Canada, the staple mentality is an important structural force affecting the planning and policy-making process.

We now turn to a closer examination of the staple mentality and its potential effects on natural resource mega-project planning processes.

CHAPTER TWO

NATURAL RESOURCE MEGA-PROJECTS AND ECONOMIC DEVELOPMENT: SOME CHARACTERISTICS OF PUBLIC PLANNING PROCESSES

2.1 INTRODUCTION

The role of natural resources in economic development has been a central concern of Canadian political economy. The staple thesis is one of the major contributions in this literature (Watkins 1989), and it deals specifically with the relationship between resource exploitation and economic growth and development in a new country. The staple thesis provides an analytical framework for understanding the economic and cultural implications of exploiting and exporting natural resources as the primary element in an economic development strategy. As Watkins has argued, the staple thesis offers an analytical approach which focuses "... on a specific activity as a unifying theme around which to organize a vast array of experience." (Watkins 1989, 25).

Following Bertram (1963, 75), staple industries are those "based on agriculture and extractive resources, not requiring elaborate processing and finding a large portion of their market in international trade." Bertram included primary manufacturing within the staple industry definition, thus expanding it beyond extraction activities. Primary manufacturing is restricted to the upgrading of the staple product into a standardized intermediate good, such as pulp.

Two themes from the staple approach are particularly helpful in understanding mega-project planning processes. The first concerns the mechanisms underpinning the creation and persistence of a staple mentality, and the potential effect of this phenomenon on the Canadian political economy. The mechanisms are complex and include the country's

colonial origins, the persistence of oligopolistic economic structures which are suited to staple-oriented economies, the large role of foreign investment and entrepreneurship, and the tendency towards the formation of overly optimistic expectations regarding the potential of staple production to stimulate economic growth and development. A staple mentality may lead to overinvestment in staples, at the expense of better economic opportunities in other sectors. The second theme is the role of the state in a staple economy. The demands of staple production require state support, and the traditional role of the Canadian state has been to provide or improve access to new geographical frontiers in the form of infrastructure and a favourable policy environment. However, Canadian governments tend to rely on market mechanisms rather than state intervention to capture the linkages promised by staple production. This rentier philosophy in government tends to support, rather than counteract, the effect of a staple mentality.

When combined with the political and technological attraction of mega-projects, these forces may exert a powerful influence on the public planning process. Government involvement to improve access to the staple may be perceived as a key issue by all participants. This problem definition may fundamentally affect how issues are formulated within the planning process. There may be a propensity to overlook the inherent risks of mega-projects, and instead focus on minimizing the short-term costs associated with the particular mega-project. The contribution of natural resource mega-projects to regional economic development may be substantially less than expected. The mega-projects may increase the state's fiscal burden and perpetuate the economy's rigidities.

The chapter begins with an outline of the staple thesis which reviews the key parameters in the model linking natural resources and economic growth. Then related work in the Canadian political economy literature on the cultural and institutional implications of staple-led economic development is reviewed, drawing out the insights related to the

creation and persistence of a staple mentality. Next, the role of the state in staple development is analyzed. Various explanations for the failure of Canadian governments to extract more benefits from staple production are examined. The discussion then turns to natural resource mega-projects. The characteristics of natural resource mega-projects are identified and analyzed within the context of the staple thesis to develop some characteristics of a natural resource mega-project planning process.

2.2 NATURAL RESOURCES AND ECONOMIC DEVELOPMENT: THE CREATION AND PERSISTENCE OF A STAPLE MENTALITY

The mechanism of how staple exploitation and export could lead to economic growth and development was first delineated in a formal model by Watkins (1963). This staple model of economic growth is a variant of the Keynesian disaggregated multiplier-accelerator model; instead of domestic investment being the lead sector in the model, staple production is. As Watkins has recently said, "economic growth is a process by which one thing leads to another - or fails to do so." (Watkins 1989, 18). The staple model, in its continually evolving form, presents the attempts of some Canadian political economists to explain the particular pattern of development in the Canadian economy. Many of the major contributions have explored directly or indirectly the mechanisms underpinning a staple mentality in the Canadian economy. These contributions are reviewed below, beginning with the basic framework as presented by Watkins over 25 years ago.

The staple model of economic growth is relevant to new countries¹ with favourable person/land ratios, an abundance of the staple, and a comparative advantage in the

¹ While much of the research in the staple tradition has ignored indigenous people, more work is emerging on this topic as time goes on (Watkins 1977a; Watkins 1977b). This research suggests that if indigenous people are necessary or significant in the extraction of the staple, they will be included in the general development process; if they are not, they will become irrelevant and experience underdevelopment.

staple's production.² If there are no cultural traditions that would inhibit staple development, and if the international demand for the staple is strong, there is a high probability that capital and labour will be attracted to the staple industry. The new country will specialize in the extraction and export of the staple, importing capital, labour, manufactured products,³ and expertise.

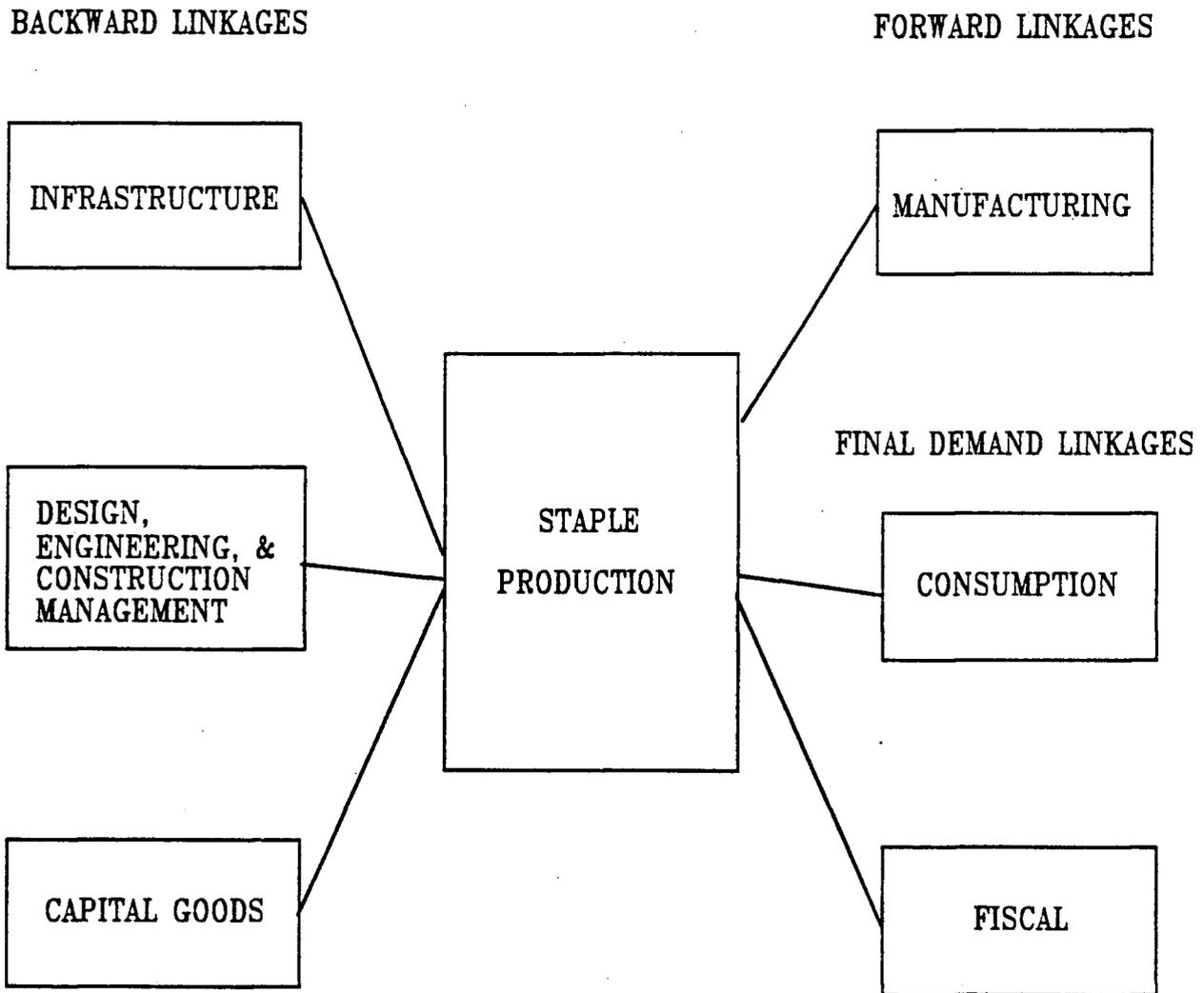
Expansion in staple production creates opportunities for the development of other economic activities. The opportunities are classified as backward, forward and final demand linkages (Figure 2.1). Backward linkages refer to industries that provide inputs to staple production; the two major categories are infrastructure linkages and capital goods linkages. Forward linkages are industries that use the staple as an input, such as manufacturing activities. There are two types of final demand linkages. Consumption linkages meet the demand for goods and services generated by the work force in the staple industry. Fiscal linkages are comprised of the generation and disposition of profits, and of resource rents which are defined as a return above normal returns to labour and capital.⁴ Rents can be further subdivided into differential and monopoly rents. Differential rent may be generated by intramarginal resources with lower production costs than resources produced at the margin. Monopoly rent may be generated by the exercise of market power by resource producers, restricting supply to maintain prices above the competitive

² Staple exploitation in regions with favourable person/land ratios will result in a high standard of living and expanding domestic markets. The ratio cannot be so low that no domestic markets exist nor so high that there is a large pool of cheap labour which restrains wage rates and prevents growth of a domestic market (Gunton and Richards 1987).

³ In a country with a relatively small population it will not be economically feasible to manufacture many products to meet local demand. Gunton and Richards (1987) have suggested that, in addition to the lack of scale economies, it is necessary to add a condition that disadvantages manufacturing as a potential export industry, such as high transport costs to major markets. This means the region has little option but to specialize in staple production, and import manufactured goods (assuming economic growth is an objective).

⁴ Watkins did not specifically mention fiscal linkages in his original formulation of the staple thesis; this linkage, and its importance, was identified in later, related work in the staple tradition.

FIGURE 2.1
BACKWARD, FORWARD AND FINAL DEMAND LINKAGES
TO STAPLE PRODUCTION



equilibrium. As Gunton and Richards (1987) illustrate, both types of rents can be substantial.

These three types of linkages, when combined, represent the multiplier effect of an expansion in staple exports. They are a crucial component of the contribution of natural resources to economic growth and development. The rate of growth in demand for the staple and the development, or lack of development, of linkages are primary determinants of the rate of growth and the nature of development in the new economy. In addition, the availability of entrepreneurial ability to recognize and develop linkage opportunities, and the ability of these entrepreneurs to adopt technologies developed in older countries are critical elements in the process.

The nature of the demand for the staple, particularly its susceptibility to complete collapse, wild fluctuations, or substitution effects, is an important variable in the model. If the demand for the staple is part of a fad such as the popularity of beaver-tailed hats in Europe during the nineteenth century then it is highly susceptible to dramatic shifts due to a change in tastes. If the staple industry has been developed to supplement existing supply in a foreign country then it is likely that the domestic staple industry will be subject to wild swings of boom and bust; when demand exceeds existing supply in the foreign country the domestic staple industry will grow quickly, but when demand falls below the existing supply in the foreign country, production will be drastically reduced in the domestic industry (Bradfield 1988). Finally, the staple, either by itself or through the industrial process it is used in, can be substituted for, creating a decline in growth of demand or an absolute decline in demand. Demand-related considerations are very important to the stability of the staple-led economy, the resource rents generated, and the economy's long-term prospects.

Supply-related factors are also important in the staple model. If the quality of the resource base is eroded the costs of production will increase. This can lead to a decline in the resource rents generated and the competitive position of the industry. If better quality reserves are available, the staple region will be displaced by other, lower-cost producers. If lower-cost reserves are not available, the price will rise, resulting in lower demand. Consequently, excellent current information on international supply prospects and plans is a crucial source of information in a staple-led economy. Another critical supply-related factor is the finite nature of many resources; non-renewable resources will eventually be exhausted, and renewable resources have an upper limit of sustainable output set largely by biological constraints. When the supply of a resource is exhausted, the economy will decline unless it is able to shift into production of a new staple or other commodities.

Opportunities for linkage development vary from one staple to another. The production function of the staple industry is an important characteristic affecting the nature and extent of linkage development (Watkins 1963).⁵ A capital-intensive industry presents large opportunities for development of backward linkages. A labour-intensive industry presents large opportunities for development of consumption linkages. The technological sophistication of the staple extraction process may also affect linkage development. Simple forms of staple extraction may not have strong linkages to research and development activities, and so may not spur on this innovative portion of the economy to the same extent that a more sophisticated technology might (Sitwell and Siefried 1984).

The staple's geographic dispersion may also have an important influence on the development of backward linkages in the country or region (Bradfield 1988). A broadly dispersed staple creates a different transportation network and offers different opportunities in development of backward linkages compared to a tightly concentrated

⁵ The production function refers to the mix of capital and labour used in the staple industry.

staple. The staple's mass, once extracted, may also influence linkage development particularly as it is reflected spatially. If the staple has a high mass and transportation costs are high, weight-losing forward linkages are more likely to develop in the region or country where the staple is extracted.

Finally, linkage development may be constrained by the supply of production factors in the new country. The staple region must be able to borrow capital abroad, and adopt technical knowledge and equipment developed in older countries (Mackintosh 1939, 11). This implies an ample availability of entrepreneurial ability in the staple region, and favourable policies on the part of the domestic and foreign governments regarding trade, investment and migration (Lower 1933).

Over the long-run, maintenance of the rapid economic growth achieved through staple exploitation may strongly depend on the successful growth of industries independent of the original staple, or on the creation of a domestic market and manufacturing industry. A region or country that remains reliant upon the staple industry for its economic base may face eventual economic stagnancy and decline because of fundamental changes in market forces, such as substitution effects or resource exhaustion. A region or country confronting the possibility of a declining staple industry due to such fundamental changes has three options: it may develop a new staple to export, shift its resources into activities not related to staples, or allow a reduction in aggregate economic activity.

The wider implications of the staple model of economic growth were recognized by the earliest writers in this analytical tradition. Innis argued that each staple created a particular pattern within Canada's institutions and social formations.

Concentration on the production of staples for export to more highly industrialized areas in Europe and later in the United States had broad implications for the Canadian economic, political and social structure. Each staple in its turn left its stamp, and the shift to new staples invariably produced periods of crises in which adjustments in the old structure were painfully made and a new pattern created in relation to a new staple. (Innis 1950, 3).

Thus the staple approach addresses how economic activity shapes and is shaped by the society's culture and institutions; it is a broad interpretive framework with many themes (Watkins 1982). The staple approach has been used in analyses of a wide range of issues in Canadian political economy, as the following examples demonstrate.

Watkins (1977a) used the staple approach to analyze the impact of hydrocarbon exploitation in the Canadian north on the Dene people. In contrast to the fur trade, where the Dene were an integral part of staple production and transport, Watkins argued that the technological and institutional characteristics of hydrocarbon production and trade would marginalize the Dene people, further exacerbating the process of underdevelopment being experienced by aboriginal people in the Canadian north. The disruptive impacts of hydrocarbon production and transportation would negatively affect the renewable resources of the North and thus the traditional Dene economy. Yet the Dene would not be compensated for these losses because their land claim, and thus their rights as resource owners, remained unresolved. In addition, the sophisticated technology of hydrocarbon production and transport would create few linkage opportunities in the North. The Dene would thus be relegated to the role of wage earners and the economic surplus generated by staple production would be drained out of the region, leaving little for re-investment in Dene-controlled economic development projects. Watkins argued these processes would result in the Dene losing their opportunity to influence or control northern resource exploitation and the northern economy, which would affect their ability to pursue independent political rights. Watkins concluded that the Dene would become irrelevant in

the future of the North if hydrocarbon production and trade proceeded under the existing institutional framework.⁶

Richards and Pratt (1979) used the staple approach to analyze changes in the nature of public entrepreneurship in Alberta and Saskatchewan during the post-World War II period. They argued that the populist culture and institutions that grew up around the agrarian, wheat-dominated economy during the first half of the twentieth century were unsuited to the new, mineral staples that emerged during the 1950s. Richards and Pratt argued that the old institutions did not survive the transition to the new staples of hydrocarbons and potash, and that this vacuum was reflected in the passive, rentier relationships established between the provincial governments and the major resource companies. Richards and Pratt argued that it was not until a new domestic elite evolved in each province that institutional changes occurred that fundamentally altered the role of the state in staple production. The provinces then became more aggressive in ensuring the collection of resource rents and development of economic linkages within their boundaries, representing a fundamental change in the nature of public intervention in staple production.

While there are numerous insights that can be found in these and other writings in the staple tradition, we will focus on identifying the forces underpinning the creation and persistence of a staple mentality. We will see that this phenomenon is rooted in Canada's colonial background and is supported and reinforced by a wide range of factors including those that influence expectation formation by staple sector participants.

⁶ Watkins contrasted this situation to the early years of the fur trade where the Dene were an integral part of the staple production and thus not marginalized from this growing economic activity.

Mackintosh (1939) argued that investment decision-making in a staple-based economy would be plagued by the formation of overly optimistic expectations in both the private and public sector regarding the potential of resource exploitation to produce economic expansion. The outcome of these unjustifiable expectations would be extensive borrowing by private entrepreneurs, resulting in large debt charges. The fixed nature of these charges coupled with the notoriously variable incomes from staple exports would place these entrepreneurs in periodic crises that would result in bankruptcies and re-organization in the economy. Further, Mackintosh argued that the large capital borrowings and risks involved in staple industries would produce a strong tendency within the private sector to lower the cost of borrowing by involving the government. Government involvement, however, would simply spread the inevitable fiscal crises to the public sector because of the same fluctuating incomes from staples, yet with more serious consequences because of the inflexible nature of public debt. Mackintosh argued that government involvement increased the rigidity of the investment burden inherent in staple-led economic development, and thus should be avoided.

There is ... a strong and natural inclination on the part of a new country to borrow extensively and thus build up heavy debt charges. Since incomes derived from the export of raw materials are notoriously variable, the economic difficulties in which new countries so frequently find themselves are coupled with the rigid expenditures occasioned by heavy debt charges. When, as is so frequently the case, an attempt has been made to cheapen the cost of borrowing by lending the credit or guarantee of the government or by the government itself making the necessary expenditures for improvements, economic difficulties find their reflection immediately in the financial difficulties of government. Pioneers are by necessity and selection sanguine people. They are prone to take over-optimistic views of the effects of such community investment on future income and to assume that government guarantees may be given at no cost. (Mackintosh 1939, 11).

Mackintosh argued there was a clear link between the formation of overly optimistic expectations regarding the potential of staples to produce enormous economic expansion

and two outcomes; the generous and optimistic mortgaging of the private sector by itself, and the assumption by the public and the politicians that government guarantees could be given at no cost (Mackintosh 1939, 11-12). Essentially, Mackintosh was arguing that societies in new countries were prone to downplay the risks of staple exploitation, to their peril. Thus, the government's role in underwriting staple exploitation, usually by undertaking internal transportation improvements, was not perceived by the public or the politicians to be a form of risk-sharing. Staple production was widely held to be a certain path to economic growth.

Innis (1930) also noted the exceptionally high level of government involvement in the Canadian economy, particularly in effecting internal transportation improvements. Innis concluded that the major problem of the Canadian economy was the high overhead cost in the private and public realms associated with these transport improvements, and that a primary way to reduce the costs was to encourage development of staple industries at the end of the line (Innis 1930, 398).⁷ For Innis, this focus on staple industries, dictated by the need to reduce overhead costs, had a tendency to become pervasive in the economy because of two related phenomena. First, Innis noted that the trade aspects of staple-led economic development, exporting staples and importing manufactured products, would tend to focus energy on the need to find more goods to export because as the new country exported more and earned more income there would be an accompanying tendency to import more. Innis's view was that this would produce a vicious cycle of expanding staple exports and manufactured imports. The second phenomenon was the tendency for the country's energy to become focused on the staple sector either directly in staple production or indirectly in industries that supported staple production. Thus when individuals and

⁷ He suggested that this level of government involvement was due to efforts to transfer large areas from the fur trade to a new industrialism, i.e. building a new economy. This observation separates Innis from Mackintosh who implied that government simply responded to the demands of the private sector. Innis recognized the interests of governments in economy-building and thus provided a broader interpretive framework than Mackintosh.

groups in the country searched for new investment opportunities there was a strong tendency to focus on finding new staples or more of the existing staples.

The economic history of Canada has been dominated by the discrepancy between the centre and the margin of western civilization. Energy has been directed toward the exploitation of staple products and the tendency has been cumulative ... Agriculture, industry, transportation, trade, finance and governmental activities tend to become subordinate to the production of the staple for a more highly specialized manufacturing community. (Innis 1930, 385).

Innis also observed that staple-based industrial complexes tend to be concentrated and centralized. In Canada's early years, monopolies or oligopolies dominated in trade, finance and transport sectors, and there was a strong centralized government and banking system. Innis argued that the concentrated nature of the economic institutional structures associated with the existing staple industry would facilitate a relatively quick and painless shift, economically speaking, to new staple industries, thus perpetuating the role of the new country. For a shift to a more industrially-oriented economy, Innis argued that an atomistic, competitive institutional framework was required, but he recognized that change in institutional structures is usually slow. Thus, Innis saw these monopolistic tendencies as a major force in the perpetuation of a staple mentality.

Watkins (1963), building on the observations of previous staple theorists including Innis and Mackintosh, argued there was a strong tendency for new countries to develop an export or staple mentality that would bias domestic investment toward staple extraction and export. Implicitly, this suggests that based on past experiences with staple trades and industries, overly optimistic expectations would tend to develop which would cause domestic entrepreneurs and investors to be risk prone where staples were involved, yet risk averse to activities not concerned with staple exports (Aitken 1961). The cumulative effect of this staple mentality would be over-investment in the staple sector which, when combined with the cyclical nature of commodity markets, would cause great boom and bust

cycles in the economy. Watkins suggested it would be difficult to break the hold of a staple mentality because the incentive to diversify was low when export earnings were high, but under opposite conditions when low export earnings heightened interest in economic diversification, the resources required to pursue diversification were absent. Over the long-term the persistence of a staple mentality could lead to the development of a staples trap, characterized by a faltering economy and a continuing focus on staples that would inhibit recognition of other economic opportunities.

Elaborating on the mechanisms implied by Watkins' arguments, Richards (1985) suggested that the tendency to form overly optimistic expectations in staple-based economies results from the general tendency in society to rely on elementary techniques in forming expectations, which is then combined with forces peculiar to staple-based economies. According to Richards, Keynes argued that people form expectations about the future using three techniques:

- 1) We assume that the present is a much more serviceable guide to the future than a candid examination of past experience would show it to have been hitherto ...
- 2) We assume that the existing state of opinion as expressed in prices and the characteristics of existing output is based on a correct summing up of future prospects ...
- 3) Knowing that our own individual judgement is worthless, we endeavor to fall back on the judgement of the rest of the world which is perhaps better informed. (Keynes 1937, quoted in Richards 1985, 59).

Thus there is a strong tendency to assume that present trends will continue indefinitely, particularly when this assumption is supported by other, apparently rigorous, projections. Richards argued that these tendencies are then combined with the optimism of the pioneer spirit that prevails in staple-based economies, and the structural barriers to social learning created by foreign direct investment in the staple industries⁸ to create the persistent

⁸ The large capital requirements of many modern staple-based industries increase the probability that multi-national corporations will be involved, and the structure of these corporations, with head office and research and development functions usually located outside the staple region, tends to inhibit 'learning by doing' for domestic interests,

phenomenon of overly optimistic expectations on the part of domestic interests in staple production.

The characteristics of commodity markets and the timing of investment decisions reinforce the tendency to over-emphasize the staple sector's role in the economy. The enormous growth rates and profits experienced during the early phases of staple exploitation, or in a market upturn, form the basis of expectations regarding future profits and investment decisions. In the rush to exploit a situation of strong demand, existing suppliers expand or new suppliers make plans to enter the market. The independent, large-scale nature of expansions on the supply side often result in overcapacity and declining prices which may threaten the economic viability of new operations. However, as Keynes suggested, during the next period of strong demand and rising prices the investment pattern, and the optimistic expectations underpinning it, repeats itself.

Additional insights into the creation and persistence of a staple mentality are provided in the literature concerned with the dependent industrialization debate.⁹ The increasing presence of US-based multi-national corporations, and perhaps Watkins's (1963) observation that foreign entrepreneurship may restrict itself to export-import functions and so limit linkage development in the staple region, encouraged many investigators to examine the importance of foreign direct investment in the economy and suggest mechanisms by which it created and perpetuated the apparently weak structure of the national economy (Aitken 1961; Watkins 1968; Levitt 1970; Gray 1972). In general,

particularly during the early stages of staple exploitation. Further discussion of this point occurs later in this section.

⁹ The concern of many Canadian political economists during the 1960s and 1970s was Canada's apparently weak economic structure and the instability it engendered, reflected in the peculiarities of the national balance-of-payments. The merchandise trade was dominated by exports of relatively unprocessed resource products and imports of finished goods. The capital account showed huge capital inflows and outflows, with payments for services dominating the outflows. The current account, comprised of the merchandise and capital account, was in a deficit position during most of the 1960s (Voyer and Murphy 1984, 19).

these analyses suggested that the high level of foreign direct investment, occurring via multi-national corporations, had strongly contributed to the creation of a 'truncated',¹⁰ uncompetitive economy in Canada with little endogenous entrepreneurial or innovative capacity. In the resource sector, these authors argued that the contribution of natural resources to Canadian economic growth had been significantly curtailed by foreign direct investment.

Foreign-owned firms in the Canadian resource sector are often part of a large multi-national corporation that has many branches related to the staple industry. Multi-national corporations may be vertically-integrated firms, with established backward and forward linkages, or they may be specialized staple producers with existing supply and sales relationships with other firms. A corporation with existing plant for processing the staple will be disinclined to build new plant in the staple region, or to sell the staple to another firm attempting to establish a forward linkage in the staple region (Bradfield 1988). The corporation may produce inputs for the staple industry or have existing relationships with backward-linked industries that make them unwilling to enter into relationships with new suppliers (Gray 1972). The limited inclinations of foreign firms to use domestic suppliers, to sell to domestic processors, or to conduct domestic processing may mean there are restricted opportunities for domestic entrepreneurs to develop these linkages (Richards and Pratt 1979). Given the limited markets, access to capital and technology by domestic entrepreneurs may also be severely constrained (Gray 1972), and thus the opportunities to 'learn by doing' may be limited (Richards and Pratt 1979). The end result may be a slower development of domestic entrepreneurial talent than might have been the case, and

¹⁰ A 'truncated' economy was defined by Gray (1972) as one having potentially less economic activity than might occur in another, more developed country given the same economic stimulus; this includes fewer supporting services, less training of local personnel in various skills, less product development aimed at domestic needs or tastes, less spillover economic activity, and less decision-making and research and development activity.

fewer technical linkages in the staple region than may have been possible if foreign direct investment had not occurred.

The tendency of foreign direct investment to restrict domestic entrepreneurial development in the resource sector may be worsened by the location of the head office of the multi-national corporation, and the concentration of specialized functions at the head office location. Multi-national corporations with established head office locations are unlikely to move them (Gray 1972), unless the existing locations cause significant inefficiencies. The task of the foreign-owned firm in the staple region may be restricted to extracting and shipping the staple as efficiently as possible. Higher order functions are not part of that mandate except as they relate to the efficient extraction of the staple. Consequently research and development capabilities related to linkage development in the staple industry may be under-developed in the staple region. The foreign-owned firms may exhibit a distinct branch-plant character (Levitt 1970; Watkins 1977b), and development of entrepreneurship, innovation and management skills may be restricted.

Even if it was economically rational to develop linkages in the staple region, the satisficing behaviour of the multi-national firms could discourage this from happening. While it might be more efficient, in an optimal sense, to investigate new suppliers or establish forward processing activities in the staple region, firms may not undertake these investigations because they are satisficers, not optimizers (March and Simon 1958). In addition, the broader corporate strategy may mitigate against linkage development. For example, diversification policies could lead to corporate research and development energies being focused on business activities unrelated to staple production. These forces may cause other countries to benefit more strongly from the demand for the staple than the staple-producing region does.

The impact of foreign direct investment in consumption-linked industries in Canada may also contribute to the persistence of a staple mentality. Gray (1972) and others have argued that Canadian manufacturing firms that are part of US-based multi-national corporations do not encourage development of non-staple related entrepreneurship and expertise that can effectively challenge the strength of staple sector participants when it comes to competing for scarce private and public sector revenues. Paralleling the arguments reviewed above, foreign-owned manufacturing industries may be designed to serve only the demand of the staple region, and not to compete internationally. Head office and research and development functions may be curtailed in the staple region, and entrepreneurial development severely constrained.

Foreign direct investment in the staple industry may also limit development of fiscal linkages and create forces that support a staple mentality. Kierans's (1973) analysis of resource rents in Manitoba's mining industry documented how resource rents can be leaked out of an economy. Gunton and Richards (1987) argued that despite changes in resource policy in the 1970s, governments have been unsuccessful in collecting resource rents for regional capital formation. Rents have continued to be leaked to external owners or dissipated in inefficiencies in the staple sector with the result of slower growth and inhibited diversification. Politically, resource rents that are not dissipated or collected can create a battlefield on which firms, labour, and governments struggle over the distribution of the resource rents (Norrie and Percy 1982; Copithorne 1979). With respect to the persistence of a staple mentality, the failure of governments to collect resource rents creates fertile ground for optimistic expectation formation regarding future profits and wages by staple sector participants. Staples remain more attractive than other sectors because of the potential for super-profits.

The dependent industrialization literature that focuses on the impact of foreign direct investment on Canadian economic development contains many insights into the mechanisms by which a staple mentality might be maintained in Canadian society, including behaviour that leads to low levels of linkage development in the staple region and limited domestic entrepreneurship. However, this literature tends to focus on how opportunities available to domestic entrepreneurs might be restricted by foreign investment. Wondering whether this was a complete answer, a number of researchers examined the characteristics of existing domestic entrepreneurship. Building on observations that Innis made many years previously, these researchers argued that domestic entrepreneurship was initially concentrated in the commercial or trade aspects of the economy and that this focus has been perpetuated by the institutional characteristics of the Canadian economy (Naylor 1975; Clement 1977).

Naylor (1975) argued that indigenous entrepreneurial expertise during a critical period in Canadian history, between 1867 and 1914, was concentrated in the finance, utilities and railroad industries, all of which were focused at that time on staple production and transport. Domestic capital accumulation occurred in the staple industries and was re-invested in them, rather than in manufacturing industries. Naylor suggested Canadian banks supported this focus on staple industries by the domestic entrepreneurs. The Canadian banks, born and raised in an era of international commodity movements, were unsuited in their philosophy or experience to industrial ventures, and exhibited a distinct preference for staple-related investments.

Naylor suggested the focus of indigenous entrepreneurs on the staple sector was the path of least resistance (Naylor 1975, 283). Canada's entrepreneurs continued to invest in the staple sectors because they possessed the requisite knowledge and expertise, were well acquainted with the risks, had established relationships with the state, and were lured on

by the potentially huge returns to be gained on their investment. These entrepreneurs developed into a very powerful group in Canadian society, and there was an enormous overexpansion in railways oriented to staple exports, which required quick staple development to maintain. This led to a vicious cycle of investment and export, and a staple trap for the Canadian economy. Naylor and others argued that the pattern established between 1867 and 1914 was perpetuated throughout the first part of the 20th century, and will continue without a dramatic alteration in Canada's oligopolistic institutional framework (Drache 1982). The implications for the nature of decision-making in the Canadian economy were clear.

In short, the necessary origins of Canada as a staple-producer are perpetuated because of the nature of the capitalist class that emerges, and re-emerges, out of the staple trades... (Watkins 1977b, 88).

Naylor concluded that the Canadian economy continues to have tremendous entrepreneurial ability in the commercial aspects of the economy, but little in the industrial elements (Naylor 1975, 282), thus reinforcing and perpetuating a staple mentality.

An additional insight into the forces underpinning a staple mentality in Canada is provided by research that has focused on estimating the actual contribution of natural resources to Canadian economic growth and development. An article by Chambers and Gordon (1966) sparked an interesting debate within the staple literature in which a number of researchers challenged the argument that staple exports have produced a faster rate of growth in the economy than would have occurred if other economic sectors had received the equivalent amount of investment. Chambers and Gordon modelled the prairie wheat boom over the period 1901-1911 and attempted to measure the economic rent generated by the wheat staple. They used a counterfactual methodology in which they proposed that the labour absorbed into the prairie wheat economy between 1901 and 1911 was instead taken up by the manufacturing sector. The difference in per capita income between the actual scenario where the labour went into the wheat economy and the counterfactual

scenario could be taken as a measure of the economic rent generated by wheat during that time period. Using this approach, Chambers and Gordon estimated that the wheat staple contributed only 8.4% of the observed growth in per capita income between 1901 and 1911, and thus concluded that staples play a much smaller role in economic development than suggested by the staple theorists.

Chambers and Gordon's (1966) analysis stimulated immediate debate. Several researchers argued that Chambers and Gordon's rent estimate was biased downwards by inappropriate assumptions (Lewis 1975; Richards 1985; Gunton and Richards 1987). While it appears that Chambers and Gordon's rent estimate was too low,¹¹ perhaps the most important contribution of this body of research is that it emphasized the opportunity costs of staple investment, and caused theorists and practitioners to re-consider the role of resource rents and intensive economic growth in Canadian economic development.¹² The Chambers and Gordon research and the subsequent debate suggest that by attributing aggregate economic growth to staple production, actors in the private and public sector exaggerate the economic contribution of staple production and reinforce a staple mentality.

The implications of this argument for government policy were developed by Copithorne (1979), who concluded that policies to reduce regional disparities must focus on improving productivity in non-primary sectors in depressed or declining regions. He was very critical of a continuing emphasis on staple production.

11 Chambers and Gordon's analysis was based on a small country assumption, which allowed them to assume labour could have been reallocated to the manufacturing sector without lowering wage rates in the national economy. This assumes that the demand curve for Canadian manufactures would have been infinitely elastic. Lewis (1975), Richards (1985) and Gunton and Richards (1987) have all criticized this, arguing that the international market for manufactured goods was not as large or as competitive as the one for homogeneous primary commodities like wheat. Thus, the additional supply of manufactured goods from Canada could have shifted the supply curve outward and lowered the equilibrium price.

12 Intensive economic growth is measured by growth in per capita income; extensive economic growth is measured by growth in total income or population.

... we believe it is important to illustrate some of the theory and evidence that cause us to doubt the importance of natural resources in the whole regional disparities picture ... As long as the natural resources relative to population theories of regional disparities hold sway, there is an obvious danger that public policy will tend to concentrate on natural resource activity and migration to the exclusion of policies aimed at raising productivity (in the non-primary sectors). (Copithorne 1979, 6-7).

This research redirected the debate over the role of resources in economic development to the generation and collection of resource rents. Many of the recent contributions in the staple tradition have focussed on issues of rent collection and management of expectations (Gunton and Richards 1987; Richards 1985; Richards and Pratt 1979).

The staple thesis and related literature emphasize that there is a strong tendency for a staple mentality to develop in economies that are based on the exploitation and export of natural resources. The country's colonial origins initially focus energies on staple exploitation. The enormous infrastructure costs engendered by staple production and transport lead to high overhead costs that require rapid economic growth to service the debt; this economic growth is usually achieved by more staple production. Rapid growth leads to more imports and a consequent search for more exports. Domestic entrepreneurship and expertise becomes concentrated in the staple sector and commercially-oriented supporting industries. An institutional framework of monopolies and oligopolies develops that is suited to this trade-oriented economy, and that tends to focus on the staple sector when looking for new investment opportunities. Foreign entrepreneurship, expertise and capital may reinforce the staple mentality through optimizing or satisficing behaviour that limits the development of linkages within the staple region. Opportunities for domestic entrepreneurs to learn by doing in new non-staple related sectors or higher-order staple-related functions may be limited because of this.

These forces are supported by the tendency of staple sector participants to form overly optimistic expectations regarding staple-related investment opportunities. The inability or unwillingness of governments to collect resource rents creates the perception of high returns in staple production, thus overestimating the yields from staple investments and perpetuating the staple mentality. The tendency to exaggerate the benefits of staple exploitation is supported by social-psychological characteristics of the nation's population, the generally simple methods used to form expectations, past experience with the enormous economic expansion staple exploitation has stimulated, and the characteristics of commodity markets.

This section explored the mechanisms underpinning a staple mentality that are found within the economic sphere. These mechanisms may be supported or contradicted by government intervention in the economy, particularly with respect to staple production. This theme is explored in the following section under the general topic of the role of the state in a staple-based economy.

2.3 NATURAL RESOURCES AND ECONOMIC DEVELOPMENT: THE ROLE OF THE STATE

The demands of staple production necessitate state involvement well beyond the constitutional framework of government, internal security and justice (Aitken 1959). The particular nature of state involvement will vary with the staple, but three general types of involvement are common: providing infrastructure for staple production, maintaining favourable terms for staple exports in international markets, and improving information for staple production. In Canada's early years, a dominant focus for state involvement was improvement in internal transportation and infrastructure systems. Later a much broader exercise of state power to support staple production evolved. However, state

activities have been overwhelmingly oriented to expanding staple exports rather than increasing the economic benefits captured within the domestic economy from existing staple production. This particular type of state involvement requires and reinforces a staple mentality as increasingly more state activities become oriented to facilitating staple production.

During Canada's early pre-Confederation history the state played a large role in effecting internal infrastructure improvements, particularly in central Canada's transportation sector (Innis 1930, 400).¹³ The rationale underpinning these efforts was that an improved transportation route along the St. Lawrence River was fundamental to controlling the staple trade within the river's drainage basin, and to accessing the opportunities associated with the expanding frontier in Upper Canada and the American West (Creighton 1939, 13). The future growth and prosperity of the colonies was linked to the success of these transportation improvements, thus justifying state involvement (Aitken 1959).

The high level of state involvement often produced financial difficulties for the state. For example, by 1831 Upper Canada had contributed 100,000 pounds (in the form of stock purchases or loans) to support the Welland Canal project linking Lake Ontario and Lake Erie. In 1834 Upper Canada authorized a further 350,000 pounds for additional improvements on the St. Lawrence Seaway (Creighton 1937). The economic slump of the mid-1830s left Upper Canada in a precarious financial position, unable to make payments on its substantial debt, a large portion of which was related to the seaway improvements.

¹³ Colonial states were also active in improving or protecting export markets. For example, the Maritime governments actively lobbied the British government to protect colonial fishing and maritime trade interests in a number of disputes with US-based groups. However, the enormity of the states' fiscal involvement in infrastructure improvements suggests this was perceived as the key to the future growth and prosperity of the colony (Aitken 1959).

Despite these early experiences, this pattern of underwriting transportation improvements was repeated in later efforts to improve the competitiveness of the St. Lawrence seaway as a trade route, and in domestic railroad construction oriented to meet the new competition from American railroads. As Creighton observed:

From the first the governments of the northern provinces had accepted the view that they must open avenues for settlement and exploitation, that they must clear and prepare the way for the colonist and the capitalist. This assistance was just as necessary in the railway age as it had been in the canal period. (Creighton 1957, 277).

By June 30, 1867 the Province of Canada had loaned over \$20,000,000 to domestic railway companies, and \$13,000,000 in interest on these loans was in arrears. However, like the St. Lawrence improvements before them, Canada's rail lines also failed to tap the trade and traffic associated with the expanding American frontier. This failure meant there were inadequate revenues to cover the fixed debt charges; the private railway companies folded and the colonial governments' financial commitments pushed them to near-bankruptcy (Aitken 1959).

At this time the colonies faced a difficult future; in the rhetoric of the day, they had to grow or die. However, their opportunities were limited. The rapid expansion in Upper Canada had resulted in settlement of all available land. Only two options offered potential salvation from the stagnation looming on the horizon, reciprocity or a new frontier. The potential for reciprocity with Britain or the USA was rapidly evaporating. As the colonists looked across the border, they saw the enormous expansion in the US that was fuelled by the expanding western frontier (Mackintosh 1939). In addition,

...the earlier experience with immigration and agricultural expansion in Upper Canada set the idea firmly in the collective consciousness that agricultural occupation of new territory creates enormous economic expansion and a wide range of opportunities for the profitable employment of capital, labour and entrepreneurship. (Fowke 1952, 243).

A gradual shift began to occur in the colonists' perceptions of what was required for the future growth and development of British North America. The old design of an international commercial empire built around the St. Lawrence was replaced with the plan of a national transcontinental economy (Creighton 1939; Aitken 1959). The colonists turned to the western frontier in Canada in the hopes it would revive investment and enlarge economic circulation within the country. This economic interest was buttressed by the growing concern about American encroachment from the south (Aitken 1959).

However, access to the frontier and the economic expansion opportunities it promised was a huge problem that the private sector regarded as insurmountable. Despite increasingly generous offers from the new Dominion government during the 1870's, no private sector group came forward to build the transcontinental railway. The National Policy was designed to overcome this problem and achieve transcontinental integration. The National Policy contained three key elements; the construction of a transcontinental railway, settlement of the prairies, and institution of a tariff system on imported goods (Fowke 1952). The railway would provide access to the frontier and the settlement policies would ensure it was populated and 'developed' quickly, thus supporting the railway investment. The tariff would also support this western expansion, as the customs duties could be used to meet railroad deficits and support the debt incurred by the state in supporting this infrastructure. Thus, a significantly broader role was adopted by the state in stimulating economic growth in the country, and as agriculture was the basis of growth on the western frontier, this role was fundamentally concerned with facilitating staple production to generate economic growth.

The National Policy and successive infrastructure investments by provincial governments were followed by a period of enormous economic expansion in Canada as the prairies were settled. Mackintosh (1939) argued that the most important characteristic of the period

between 1895 and 1920 in Canada was the high rate of investment induced by the improved expectations of profit from the exploitation of Canada's natural resources, particularly wheat. In this way, the link between staple production at the frontier and economic growth was reinforced in the minds of Canadians, and the state's role in guiding and stimulating economic growth, and in nation-building, was fully embraced by Canadian society.

The Canadian state continued to play a key role in expediting staple production in the twentieth century by providing infrastructure and a supportive policy environment (Aitken 1959). Three staple industries have dominated the Canadian economy since World War II; mining, pulp and paper, and oil and gas. Cheap hydro-electric power and cheap forestry resources were key elements in the growth of the pulp and paper industry in Canada, and both of these factors were under the control of the Canadian state.¹⁴ To make the newly discovered iron ore deposits in Quebec and Labrador competitive, improvements to the St. Lawrence seaway to facilitate the passage of large ocean-going vessels were required; in 1954 a joint agreement between Canada and the USA to undertake these improvements was signed. To encourage exploration for oil and gas reserves in Canada during World War II, the Canadian government instituted major tax concessions for exploration companies. In other staple regions such as BC the provinces developed large resource ministries that produced resource inventories, studied market conditions and researched new technologies (Marchak 1983). Following the broadening of state involvement established with the National Policy, state efforts to facilitate staple production in the twentieth century were increasingly broad-based.

Rapid economic growth has accompanied new waves of staple production in Canada, but increasingly critics have questioned whether Canadians are getting as many economic

¹⁴ In addition, the state acted to induce the migration of pulp mills to the raw material source by instituting a tariff on the export of raw pulpwood.

benefits as they should from staple exploitation. As suggested in the previous section, many researchers have argued that linkages are underdeveloped in Canada, and that resource rents are 'leaked' out of the economy or dissipated in inefficient behaviour. Yet the provincial and federal states did not respond to these criticisms, and devoted little effort to developing more value-added linkages within the Canadian economy. A number of explanations have been advanced for this rentier philosophy within the state, and these are briefly reviewed below.

McMillan and Norrie (1980) defined a rentier society as one in which the government acts as society's agent to collect economic rents and distribute them to residents while allowing market forces to shape the economy.¹⁵ Rentier governments are risk and conflict averse, preferring to focus energies on uncontroversial policy issues and initiatives such as the machinery of government and re-election platforms (Richards and Pratt 1979). Thus, they prefer to collect some resource rents and distribute them in the form of a high level of social services rather than pursuing reforms that would increase the economic growth and development generated by existing resource industries. Should economic growth become an issue in the society, rentier governments are prone to encourage new staple production rather than attempt to derive more economic benefits from existing resource industries (Drache 1982). Given the difficult negotiations involved in maximizing domestic benefits from resource development, the tendency to focus on encouraging new resource developments is not surprising. New resource developments tend to encounter little resistance; the 'pie' becomes larger and no-one is forced to give up their existing shares. This course is significantly less conflict-ridden than one which attempts to change the distribution of the existing pie by squeezing more benefits for Canadians out of existing staple industries. Richards and Pratt (1979) suggested the characteristics of classic rentier

¹⁵ A rentier society may take a collectivist or populist form (McMillan and Norrie 1980). A collective rentier society will distribute the rents in the form of low taxes and a high level of services. In contrast, a populist rentier society will pay dividends to the residents.

behaviour in the resource sector are: providing favourable access, long term leases, low royalties, and guarantees of no government competition. In addition, the government may provide assurances of political stability, a sound business climate, and protection of property rights.

One explanation of the persistence of a rentier philosophy within the state is that there is an ideological or cultural bias within society inimical to state intervention beyond already established roles. Arndt (1981) argued that colonial nations tended to evolve a set of attitudes that equated staple production with economic development. The imperative thus became ensuring that access to resources, which are increasingly located at the frontier, was available. Transportation was obviously a key element, and the cost of transportation became an accepted component of the national overhead cost. The government's involvement in encouraging this transportation and staple production became an accepted role for the state (Mackintosh 1939). Drache (1977) argued that this set of ideas has taken on the character of an ideology within Canada, and he called it the ideology of the 'National Dream'. Resurrected during times of economic instability and transition, this ideology suggests that looming economic difficulties can be solved by a new round of resource exploitation on the Canadian frontier, supported by Canadian government subsidies. Drache argued that the 1970s were an unstable period, and the energy mega-projects proposed at that time, such as Syncrude, James Bay and the Mackenzie Valley, resulted from the re-introduction of the National Dream ideology.

This explanation of a rentier philosophy within the state rests on the argument that there is a widespread perception that resource development is equivalent to economic development, and that the role of the state is to facilitate resource development, particularly when an economic crisis appears to be looming on the horizon. These perceptions may restrict the range of opportunities considered by governments when they

are faced with policy issues related to staple production. Richards and Pratt (1979) suggested that ideological biases may screen potential courses of action that are open to governments and that could produce improved results when compared to the probable outcomes of a rentier approach. For example, if a government does not consider public ownership to be a viable option, this may limit the government's power in negotiations and policy development because it removes the most powerful tool available to governments. While these authors appeared to be referring to liberal versus conservative interpretations of the role of the state, their ideological argument could be extended to the restriction of the state's role in staple production to that of facilitator, not producer.

A second explanation of a rentier philosophy within the state focuses on the dynamics of the policy-making process. Rather than making decisions according to the rational-comprehensive model, the governmental decision-making process is characterized by incrementalism and partisan mutual adjustment (Lindblom 1959), with the additional complicating factor of bureaucratic inertia (Richards and Pratt 1979). Within these processes, the tendency is to perpetuate the status quo, or produce outcomes that favour the most powerful interests in the process. The concentrated nature of staple industries and the enormous size of many of the multi-national corporations involved suggest that decisions may favour the interests of these firms, which are focussed on maximizing profits.

Gunton and Richards (1987) argued that important insights into resource policy-making are provided by using a model of the political marketplace based on concentrated benefits and diffused costs (Olson 1982). Interest groups weigh the costs of participating in resource policy-making by comparing the money and time involved in participating to the potential gain (equal to the size of the gain times the probability of success). If the expected benefits do not exceed the costs, the interest group will tend not to participate.

Successful interest groups tend to define their mandates narrowly and thus be relatively small. This limits the potential for disagreement within the group and keeps costs low. A small, narrowly defined interest group also mitigates against the phenomenon of the 'free rider' where people who do not contribute to the lobbying effort may still easily claim a share of the benefits achieved through participation in policy-making. Eliminating the free rider problem increases the interest group's internal strength. If the costs of an interest group's recommended policies can be diffused over a large number of people for whom formation of a counter-lobby is prohibitively costly, the interest group's suggestions are not likely to provoke widespread opposition. Consequently, the most likely outcome of policy-making is a policy that confers benefits on a narrowly-defined interest group while spreading the costs across the general population.

Gunton and Richards (1987) identify four important interest groups in resource policy-making; the citizens of the resource-owning political jurisdiction, government bureaucrats, owners and workers in resource firms, and consumers of the resource. They argued that citizens and consumers are unlikely to participate in resource policy-making because the expected benefits of doing so are so widely spread that the expected benefits per participant are lower than the costs. Thus, Gunton and Richards identify the key interest groups in resource policy-making as the government bureaucrats and the owners and workers in resource firms. Government bureaucracies are widely recognized as complex entities with their own internal dynamic. Individuals within the bureaucracies may act to achieve personal goals of power and security which may work against making any changes in existing policies, with the result that bureaucracies may end up serving the interests they were created to regulate. The owners and workers in resource firms can gain substantial and concentrated benefits from lobbying efforts; the owners from generous state concessions and the workers from increased employment and wages. The concentrated nature of most resource industries means that the free rider phenomenon is

not a problem. Thus, the interests and dynamics of these key interest groups creates the situation where the public interest tends to become closely associated with the private interests in the process (Gunton and Richards 1987; Nelles 1974).

Using a similar model, Peter Hall attempted to address these issues when he investigated a series of Great Planning Disasters (Hall 1980). He also argued that the public planning and decision-making process involved a complex series of interactions among various groups or actors, but focused on the motivations affecting the behaviour of bureaucrats, interest groups and politicians. According to Hall's analysis, the major motivation for politicians is maximizing votes which they accomplish by remaining near the middle ground and avoiding any major changes to the status quo unless they can distribute the costs widely and the benefits narrowly and gain votes. Bureaucrats are motivated by concerns of policy and programme maintenance and thus are inherently in favour of the status quo. Only when new bureaucracies are created, usually as a result of political initiative, is there a strong dynamic of change and this is primarily oriented to enlarging the mandate, resources and power of the bureaucracy. The result is that there is a strong tendency to over-produce public goods. Finally, interest groups are focused on narrow concerns and generally constitute a minority in the population. They are chiefly concerned with getting their issue to the top of the political agenda. In the field of economic policy-making, the concentrated nature of the potential benefits to a particular group in the private sector, and their superior resources, generally lead these interest groups to be most dominant in the planning process. Hall's inclusion of the politicians as an interest group in the process is a useful enlargement of Gunton and Richard's (1987) model.

A third explanation for adoption of a rentier philosophy within the state rests on a critique of government management capability. When attempts by the public sector to improve the benefits flowing to the Canadian economy from staple production have been attempted and

failed, explanations have tended to focus on the inexperience of the government (Rotstein 1971). Richards and Pratt (1979) suggested the state's lack of knowledge regarding a staple industry, and its inexperience in negotiation may leave it little choice but to adopt rentier behaviour. During Canada's nation-building phase, governments were primarily concerned with aggregate growth, i.e. the total increase in national income and population (Anderson 1985). Government energies were focused on promotional activities; the major efforts were concentrated in improving access to Canadian resources, ensuring that the resource development opportunities were taken up by guaranteeing a favourable business climate, and in obtaining a financial return for the public (Nelles 1974). These concerns created an abundance of government expertise in areas such as transportation and resource identification, but not in the financial and economic aspects of resource development. Consequently, in the post-WWII period when governments began to be more concerned with the growth in per capita income generated by resource development and regulating the nature of resource development (Anderson 1985; Nelles 1974), there was little expertise within government, either politically or bureaucratically, to apply to the new concerns.

Based on Mathias's (1971) review of a number of cases where Canadian provincial governments had attempted to 'force growth', Rotstein suggested that provincial governments were vulnerable, if not helpless, before the magnitude and complexity of the development projects they attempted to negotiate, and before the sophisticated and experienced multi-national corporations that were involved (Rotstein 1971). In Mathias's case studies, the provincial governments had inadequate knowledge and expertise in the political and/or bureaucratic ranks to gain a clear picture of the resource industry and to weigh the arguments put forward by the multi-national corporations. The multi-nationals, in comparison, had enormous resources in the technical, financial and legal aspects of the staple industry which they brought to bear in negotiations with the inexperienced

governments (Rotstein 1971). This imbalance in knowledge and expertise placed the governments in a weak bargaining position and overwhelmingly favoured the multi-national corporations. The result was that 'forced growth' resulted in the promotion of uneconomic projects at public expense.

Payne (1982) provided another case study supporting this argument in his analysis of efforts by a new NDP government in British Columbia to increase the province's share of the resource rents generated in the mineral sector. The NDP government attempted to institute a new royalty scheme, but the inexperience of the new government resulted in poorly designed and implemented policies. The corporate interests were able to rally other interests within the province in an effective campaign against the changes.

Richards and Pratt's (1979) case studies of state intervention in Alberta and Saskatchewan's staple industries in the 1970s suggest that the government's poor bargaining position may not be maintained indefinitely. They argued that governments have a significant incentive to move up the learning curve and develop indigenous expertise in the staple industries, thus placing them in a significantly improved bargaining position. Further, Richards and Pratt suggested that a dramatic shift in perceptions and attitudes by domestic interests is possible and may form an effective source of change, pushing the state to institute aggressive reforms to increase the domestic benefits from staple production. Their case studies suggested the emergence of a provincial elite interested in economic growth and development in the provincial economy is a critical factor in changing the state's role in staple production. This elite, located in the political sphere in Alberta's case and in the bureaucratic sphere in Saskatchewan's case, was able to use the power of the state to change the rules of the game to produce more favourable results for the provincial economies. The states' actions were precipitated by federal encroachments on resource revenues, and thus were initially defensive. They became

aggressive as the states continued to pursue linked development and diversification based on the resource rents they collected. These case studies suggest that provincial pressure groups can be instrumental in insisting that changes be made, but that aggressive state intervention is required to overcome the significant barriers to obtaining more of the economic growth and development benefits of staple production.

While the state has broadened the policy instruments and interventions used to encourage economic growth within the country, the dominant purpose of these interventions is to facilitate new staple production, rather than improve the benefits within the domestic economy from existing staple production. The persistence of a rentier philosophy within the state may be the result of ideological or political forces, inexperience with a new staple, or some combination of these three. The implications of this role and philosophy for mega-project planning processes will be described in the next section.

2.4 NATURAL RESOURCE MEGA-PROJECTS AND ECONOMIC DEVELOPMENT: SOME CHARACTERISTICS OF PUBLIC PLANNING PROCESSES

In 1981 the Canadian government released its statement on Economic Development for Canada in the 1980s (Canada 1981a), a report that catapulted natural resource mega-projects to the top of the national economic development agenda. The federal government's economic development strategy was based on three arguments. First, natural resources would be the leading sector of the Canadian economy in the future because of the shift that occurred during the 1970s in the terms of trade for resource commodities. Second, a great number of large-scale investments, mega-projects, in Canada's resource sectors were planned for the next two decades, and mega-projects would provide unique opportunities for the growth of linked industries in manufacturing and services. Third, this economic

development strategy would benefit all of Canada's regions at the same time because of the distribution of the planned mega-projects (Canada 1981a, 2-9). Natural resource mega-projects promised to provide a new era of economic growth and development for Canada and her regions. However, the strategy argued that the pace of the mega-project investments would have to be managed to ensure that enduring and diversified regional and national economies would be achieved.

The major premise of the federal government's statement on economic development was that the leading opportunity for the Canadian economy "lies in the development of Canada's rich bounty of natural resources." (Canada 1981a, 2). Doern (1983) argued this premise was based primarily on a document prepared by the Ministry of State for Economic Development, referred to as the Medium Term Track (MTT) document. According to Doern (1983), the central argument in the MTT document was that a fundamental and essentially permanent economic shift took place in the 1970s that strengthened Canada's traditional comparative advantage in the production of basic commodities, related manufacturing products, and high productivity, high technology manufactured goods. Commodity prices had increased dramatically in real terms relative to manufactured products in the 1970s. While the MTT document projected no further real increases in prices, it argued there would not be significant decreases either. Thus, "... the shifts in the terms of trade toward basic materials can be expected at least to be maintained in the medium term, and perhaps even to strengthen." (quoted in Doern 1983, 231).

In the late 1970s, large-scale investments were planned for many resource sectors in all regions of Canada. The report of the Major Projects Task Force (Canada 1981b) presented a summary of all projects proposed for implementation by the year 2000 that involved a capital investment of more than \$100 million. The estimated investment totalled \$440

billion; 90% was targeted at energy production and distribution and hydrocarbon processing and almost half was forecast to occur in western Canada and the Territories. Based on a review of past major projects, the Task Force argued strongly that many of the potential benefits from these projects had not accrued to Canadians. To change this pattern the government would have to implement an industrial benefits strategy aimed at the planned major projects. The Task Force argued that if governments aggressively pursued the enormous industrial opportunities linked to the major projects, the potential of these projects to "... make significant long-term improvements in the industrial structure ..." of Canada's regional and national economies was enormous (Canada 1981b, 9).

Certain characteristics of major projects make them particularly amenable vehicles for increasing Canadian industrial and regional benefits:

1. Major projects are identifiable, distinct entities, thus facilitating analyses which focus on concrete problems and practical solutions.
2. Major projects are of such a size and have such potential impact, both individually and in aggregate, that opportunities exist to make significant long-term improvements in the industrial structure by influencing the way in which projects are carried out.
3. Major Canadian projects proposed for implementation over the period to the year 2000 are well distributed in impact throughout many major industrial sectors. It is particularly significant that a number of these projects involve developing sources of raw materials, which in themselves provide opportunities for generating additional economic activity through further product upgrading. This, in turn, could result in closer integration between the Canadian resource and manufacturing industries.
4. The impacts of the major Canadian projects proposed for implementation over the period to the year 2000 will be distributed throughout all regions of Canada. These projects can thus provide opportunities for building stronger regions as well as a stronger country.
5. Major projects are highly visible to the public, and the key participants in project planning and execution are therefore likely to be subject to more than usual pressure to perform in ways which are in the best interests of Canada.

6. The nature and significance of major projects are such that government influence and / or participation are markedly higher than is the case in other industrial activities. (Canada 1981b, 9).

The Task Force perceived major projects as a unique force with the potential to transform the Canadian economy. Major resource projects would be an engine of growth and change, driving a re-orientation of the Canadian manufacturing and service sectors towards activities supplying inputs to the resource industries and those that added value by upgrading the basic resource commodities. This transforming quality was further enhanced by the potential of major projects to drive economic change with apparent regional equity, always a concern in the Canadian national fabric.

This theme of the regional development benefits of mega-projects was emphasized in the federal government's statement on economic development.

Seldom in this century has it been possible to identify genuine prospects for growth in every region. But this is the prospect today. There are now unique opportunities for economic development in the Atlantic region and in Quebec, in Ontario and the West, and in the northern regions. (Canada 1981a, 3).

Mega-projects, because of their link to natural resources and the land, apparently did not have to be coaxed to develop in peripheral regions, a characteristic of previous efforts in regional development that focused on traditional industrial incentive programs.

An additional attractive quality of natural resource mega-projects was that the government could play a key role in generating and directing their transforming potential. The Task Force on Major Projects argued that the level of government involvement would be higher than normal because of the size and significance of these projects. The Task Force also argued that to maximize the benefits to Canada's regional and national economies the governments would be required to adopt a strong interventionist role. However, the federal statement on economic development presented two rationales for

government involvement: 1) that the inflationary and environmental impacts of these projects would require careful assessment and control, and 2) that the potential of all projects proceeding at once or too close together temporally or spatially could mean that potential industrial benefits would not be realized because of supply-side limitations on capital, labour and entrepreneurship. Thus, government intervention would be required to manage the change that mega-projects would bring.

Only a reasoned pace will permit us to marshal the enormous financial resources needed to fund this development. Only a reasoned pace will permit local indigenous manufacturing and service industries to flourish and thus build an enduring and diversified economic base. (Canada 1981a, 5).

The federal government's strategy did not extend to formally implementing an industrial benefits policy,¹⁶ but a number of institutional arrangements were suggested to increase the linkages developed in the Canadian economy such as an Office of Industrial and Regional Benefits (Doern 1983).

Doern (1983) argued that, with the federal government's 1981 statement, mega-projects slipped to the forefront of Canadian economic development, a place that they really had no right to be. The total projected investment, while very large, represented less than 10% of the total investment in the Canadian economy during the period, and none of the background reports leading up to the 1981 statement, except the report of the Major Projects Task Force, had specifically emphasized mega-projects as the central element of the nation's economic development strategy.¹⁷

¹⁶ In practice however, the national government and several provincial governments did negotiate industrial benefits in return for government funding or subsidies during the mid 1980s.

¹⁷ Doern (1983) suggested that mega-projects simply happened to 'fit the bill' at the time, meeting, in the mind of key senior politicians, a number of the government's priorities, including a strong desire to raise the federal government's visibility, and a driving concern to address the issue of energy policy and particularly concerns about security of energy supply. In addition, Doern (1983) argued that the mega-project emphasis diffused the ongoing debate about an appropriate industrial strategy for Canada, a debate the federal government was unwilling to pursue in a climate of economic uncertainty and political malaise.

The emphasis on mega-projects by the federal government led to high expectations and when several projects failed or were shelved in early 1980s, the response from the opposition parties overemphasized the failure (Doern 1983). The suggestion that mega-projects were gone, never to appear again, was, however, unwarranted. Large-scale undertakings have a long history in Canada. From the St. Lawrence seaway improvements and numerous railway projects including the enormous Grand Trunk and Canadian Pacific undertakings in the mid-1800s, through to the construction of the Churchill Falls Dam, the WAC Bennett Dam and James Bay I hydroelectric complex in the mid-1900s, Canadians have contemplated and undertaken large-scale projects.

There are several reasons for the persistence of natural resource mega-projects. Mega-projects, particularly when they are located in frontier regions, have a particular symbolic meaning that is very appealing to Canadians. Perhaps they are part of our national psyche, as suggested in an editorial on the second phase of the enormous James Bay hydroelectric mega-project; "As the decade ends, we may again experience the luxury of considering the risks of opportunity on a large scale - Canada as we prefer to know it." (Globe and Mail, 15/3/88, A6). Further, the idea of a mega-project, once developed, is very persistent. Large-scale projects that are shelved resurface over time, with their private or public sector proponents putting the mega-project forward and 'testing the water' perhaps several times before conditions gel (Bryant 1982).

Currently, many of the mega-projects on the drawing boards in the early 1980s are back in the spotlight. In Alberta, the OSLO and Syncrude developments are in the public eye, as is Hibernia in Newfoundland and the second phase of the James Bay hydroelectric development in Quebec. Thus, as Doern (1983) suggested, it is important that we learn more about the nature of these projects in a number of dimensions.

The Task Force on Major Projects defined a major project as one involving a capital investment of \$100 million or more. The Task Force compiled a list of 325 major projects, 90 of which were projected to have capital costs exceeding \$1 billion. For the purposes of this research, these are the mega-projects; they are an order-of-magnitude larger than a major project. This definition is in keeping with the common use of the term in the latest round of public attention lavished on these initiatives. The mega-projects in the spotlight most recently have all required investments of \$1 billion or more. In addition, the mega-projects have often involved the combination of several major projects, and consequently a large number of proponents and the public sector.

A brief description of several of these mega-projects is useful background against which to place a list of their major characteristics. Beginning in the west, the North East Coal Project was developed in northeastern BC at an estimated capital cost of \$2 billion (1983\$C). This mega-project involved construction of two metallurgical coal mines, a new town and access roads, a new rail line, and a new port, along with upgrading of existing rail lines. Two mining companies, three crown corporations and various provincial and federal government departments were involved in planning and constructing the mega-project; the planning analysis and evaluation phase lasted 5 years, and construction took approximately 2.5 years. Annual coal output from the two mines was expected to be 7.7 MMTPY, with additional tonnages as more mines were developed in the area.

In Alberta, the OSLO mega-project and the Syncrude expansion, both located in northeastern Alberta, each have projected investments of \$4 billion (1988\$C). These are both petroleum-based mega-projects, using advanced technology to extract light crude oil from Alberta's immense tarsands. The OSLO mega-project involves a consortium of five oil companies and the Alberta government; Syncrude is owned by eight companies. The

construction phase for the OSLO mega-project is expected to last 5 years, for Syncrude the estimate is 8 years. Oil production from OSLO is expected to be 72,000 barrels per day; yield from the Syncrude expansion would be 75,000 barrels per day. Together they would boost Alberta's crude oil production by about 10%.

In Saskatchewan, the heavy oil upgrader proposed for Lloydminster is another mega-project in the petroleum industry designed to use advanced technology to produce light crude from petroleum-containing formations. Originally a larger project with capital costs of \$3.2 billion, the project was eventually scaled down to a capital investment of \$1.3 billion. Only one oil company, Husky Oil, is involved in the mega-project, although it has approached other companies with the idea of bringing in new partners. Husky Oil was unsuccessful in 1988 in their attempt to get more private sector investors and so the company approached the Canadian government as a potential investor. The mega-project is expected to have a construction period of 3 years, and to produce 46,000 barrels per day of light crude oil.

In Manitoba, construction began on the Limestone hydroelectric mega-project in 1985. Estimated to cost approximately \$2 billion by the time it is completed in 1990, the dam is located on the Nelson River in the northeastern region of the province, 600 kilometres upstream from Hudson Bay. Limestone will produce 1,280 Megawatts of power when completed and will increase electricity production in Manitoba by 25%. Manitoba Hydro, the crown corporation responsible for hydroelectric power in the province, has negotiated power sales contracts with US buyers expected to generate revenues of \$4.3 billion over 16 years. Plans are currently underway for another major dam on the Nelson River, the Conawapa project, with an estimated cost of \$3.2 billion.

In Quebec, Premier Robert Bourassa announced that the second phase of James Bay hydroelectric development would begin in 1989. Estimated to cost \$7.5 billion, the construction of this hydroelectric complex will take 7 years to complete and will produce 2,500 Megawatts of power. Located in the LaGrande region in northwestern Quebec, the project involves a number of river diversions and construction of 3 dams, in addition to new transmission facilities. Most of the power will be sold to the USA.

On the east coast, the Hibernia off-shore oil development is a prominent mega-project. Expected to involve capital investment exceeding \$5 billion, the oil field is located 300 kilometres east of St. John's in Newfoundland and has the potential to produce 110,000 barrels of oil per day. A private sector consortium of five companies are involved in the mega-project, and the Newfoundland and Canadian governments have been deeply involved in negotiations with the consortium over a number of issues, including industrial benefits in Newfoundland.

This brief review, summarized in Table 2.1, suggests a number of common mega-project characteristics. One of the most striking aspects of these mega-projects is their magnitude, in terms of investment, employment and output. All of the mega-projects listed in Table 2.1 involve investment of more than \$1 billion, but many are closer to \$4 or \$5 billion. Related to their immensity, the employment generated is enormous particularly during the construction phase. Thus the short-term economic benefits promised by mega-projects are huge. This is especially true for the hydroelectric mega-projects. Also, most of the projects will increase the provincial output in their particular resource sector by 25%. In 1986, the two mines in the NECP produced approximately 35% of all the metallurgical coal produced in BC. The Limestone project will increase electricity production in Manitoba by 25% when it is completed. The Syncrude expansion and OSLO development will increase Alberta's supply of synthetic oil by 25%, and currently one-half

TABLE 2.1
SELECTED CHARACTERISTICS OF SOME NATURAL RESOURCE MEGA-PROJECTS IN CANADA

Megaproject	Location	Estimated Capital Cost (1988\$C)	Direct Employment		Output	Operating Lifespan	Construction Period
			Construction	Operation			
NORTH EAST COAL Coal Mines	Northeastern BC	\$2.5 billion	2700 person-yrs.	1850 jobs	6.4 MMTPY	20+ yrs.	3 yrs. 1981-1984
LIMESTONE Hydroelectric	Nelson River, NE Manitoba	\$1.7 billion	6000 jobs	NA	1280 MW	20+ yrs.	5 yrs. 1985-1990
JAMES BAY II Hydroelectric	LaGrande Region, NW Quebec	\$7.7 billion	40000 jobs	NA	2500 MW	20+ yrs.	7 yrs. 1989-1995
SYNCRUDE EXPANSION Synthetic Oil	Fort McMurray, Alberta	\$4 billion	7000 jobs	1400 jobs	75000 b/d	NA	8 yrs. 1989-1996
OSLO Synthetic Oil	Kearl Region, Northern Alberta	\$4 billion	7000 jobs	6270 jobs	72000 b/d	35 yrs.	5 yrs. 1991-1996
HEAVY OIL UPGRADER Synthetic Oil	Lloydminster, Sask.	\$1.3 billion	4300 jobs	NA	46000 b/d	NA	3 yrs. 1989-1992
HIBERNIA Offshore Oil	Offshore Newfoundland	\$5.2 billion	1400 jobs	1100 jobs	110000 b/d	20 yrs.	6 yrs. 1989-1995

MMTPY = Million Metric Tonnes Per Year
MW = MegaWatts
b/d = barrels per day

of Alberta's total oil supply is from synthetic production. In addition, the projects are physically large; they involve very large land areas and often very large structures. For example, part of the Syncrude expansion required a new module to increase the processing capacity of the plant. The module, built in Edmonton, weighed 204 tonnes and was 9 meters wide by 21 meters long by 9 meters high. Four trucks were required to haul the module to Fort McMurray from Edmonton and the highway had to be closed for a day.

Mega-projects also tend to be discrete undertakings compared to policy or programme initiatives. Doern and Toner (1985) suggested that, because so much attention is directed towards the planning and construction phases of mega-projects, they tend to have a distinct beginning and end. This discreteness, combined with their magnitude, means that mega-projects have high public visibility. Public and private sector participants in a mega-project may experience visible success, and this success may bring far-reaching positive impacts.¹⁸ For example, the private sector participants may develop and strengthen their reputations for successfully negotiating complex agreements and organizing and completing complex tasks. Politicians may develop a reputation for bringing large investments to particular regions, enhancing their prospects for re-election.

The desire to achieve this success, or the unwillingness to experience failure, may drive the participants to continue with the planning phase despite serious obstacles. This can be further complicated by the empire-building tendencies of public or private sector bureaucracies (Downs 1966; Niskanen 1973; Breton 1974). Information may be distorted to promote projects that provide organizations with prestige.

Another implication of the large, discrete quality of mega-projects is that public and private sector participants may be subject to more pressure to ensure that the mega-

¹⁸ The discrete aspect of mega-projects also allows the public and private sector participants to suffer conspicuous failure.

project contributes to the public interest than would be the case with a smaller project (Canada 1981b). The high visibility level makes them targets for criticism, and they may be perceived as opportunities to introduce new procedures or to negotiate different arrangements than would be the case for smaller projects. These perceptions may be strengthened if the level of government involvement in the mega-project is high.

Another important characteristic is the capital-intensity of these mega-projects, which makes them very sensitive to financing and capital market conditions (Doern and Toner 1985). This sensitivity encourages all parties to deflect as much risk as possible to other participants. Thus, complex negotiations in the financing of these projects are commonplace, and there is a tendency to increase the number of participants to spread the risk.

Natural resource mega-projects are very complex undertakings. Many of these projects involve numerous actors from the public and private sector, and the composition can change substantially during the planning process. The public sector may be involved by providing grants, loan guarantees, or transportation infrastructure, or by becoming a partner in the project. In addition, the public sector is often involved in the planning processes for the mega-projects through its project analysis and environmental assessment processes. Further complicating the situation, the private sector participants are often a consortium of firms with numerous sub-contracted participants. The composition of the consortium may change substantially during the planning process as the participating firms may be in substantially different fiscal positions and have different risk tolerances (Doern and Toner 1985). This increases the uncertainty surrounding the mega-project.

Doern and Toner (1985) argued that mega-projects have a higher probability than a normal project of triggering concerns in a large number of related policy fields. This

increases the number of government departments involved in the planning and assessment procedures, and may lead to the creation of special planning processes for mega-projects. This tendency to create *ad hoc* planning processes is amplified by the unique nature of mega-projects; different packages of policy instruments to suit the particular characteristics and components of each mega-project are often required. Responding to the uniqueness outside 'normal' planning processes places extraordinary pressures on public sector departments, and often calls discretionary powers into play.

The magnitude, capital-intensity, complexity and visibility characteristics all make mega-projects risky undertakings in a shifting political and economic environment. Mega-projects have long lead times and long operational periods, during which time economic circumstances may change, particularly given the cyclical nature of commodity markets. In addition, mega-projects often involve application of new technologies, with which the companies may not have any previous experience. The projects are often located in wilderness areas or regions that are sparsely settled; they may involve fundamental environmental changes, the consequences of which cannot be predicted.¹⁹ Finally, most of the recent mega-projects are oriented to supplying the USA with energy and are based on a fundamental assumption of increasing growth and demand for energy in that country. While selling into a single national market raises the issue of potential trade barriers in the future, a more important long-term concern may be the supply-side focus of a national mega-project strategy.

A very important additional characteristic of mega-projects is their symbolic meaning, comprised of technological and emotional elements. Rooted partially in the technological age which places a high value on the ability of humans to shape nature to meet their

¹⁹ For example, both Quebec and Manitoba are installing hydro-electric mega-projects on river systems that are major tributaries to Hudson Bay. The cumulative effect of these installations on the ecological environment is unknown.

needs, mega-projects may represent the ultimate achievement for some. Canadians may have a stronger affinity for this value than other nationalities; our geography and sparse settlement present many challenges to anyone wishing to live outside an urban centre, and to people wanting to develop the potential of the land. An editorial in Northern Perspectives commented that

Perhaps it is the sheer immensity of the land itself that compels politicians and engineers to dream up ever-more-grandiose mega-projects and multi-billion-dollar schemes. Or perhaps the frontier mentality, which equates progress with the ultimate exhaustion of resource development potential, is the inevitable outcome of our technological society. (Anon. 1987).

The technological achievement of mega-projects is a powerful force in Canadian society; this achievement is perceived to build Canadian expertise, a stronger economy, and a stronger nation. Canadians pride themselves on their engineering expertise; three of Canada's engineering firms are among the top ten in the world in terms of sales. These engineering firms built their expertise and reputation

... on the basis of having tamed inhospitable climate and geography to build two transcontinental railways and some of the globe's most impressive hydroelectric complexes among other projects... (Lilley 1985, 66).

The first phase of Quebec's James Bay hydroelectric complex was a key mega-project in the development of this expertise. The project was "... a major achievement made possible by the competence of Quebec's engineers, managers, workers, contractors and manufacturers." (Societe d'Energie de la Baie James n.d.). Canada's largest three firms in consulting engineering and construction, Lavalin, SNC and Monenco, were extensively involved with the first phase of James Bay, and have used their expertise to bid on and win hydro projects abroad (Lilley 1985; Gamble 1987).²⁰

²⁰ The continuing involvement of these companies and certain individuals in mega-projects is notable. Thomas Kierans, the major advocate of the Great Recycling and Northern Development (GRAND) Canal project, is a veteran of the Churchill Falls hydroelectric mega-project in Labrador, and the venture is backed by powerful engineering companies. In 1987, Kierans - who became President of the investment banking firm of

The link between Canadian engineering and mega-projects is a strong and continuing one. In the early 1980s, 25% of Lavalin Inc.'s business, Canada's largest engineering firm, was associated with Canadian mega-projects (Lilley 1985). In an interview with the *Globe and Mail* (2/7/88, B1) William Blundell, Chairman of General Electric Canada Ltd. which won the contract to provide the turbines and generators for the Limestone mega-project in Manitoba, stated that

Canada is a hydro country with big projects build on remote rivers from which power is moved long distances in a harsh environment. As a result of this experience, Canadians are better at building the large machines, while Europeans, accustomed to smaller-scale projects, are better at building smaller ones. So projects like Limestone and James Bay are really playing to our technical strengths.

In the same article, Timothy Reid who is Dean of the Faculty of Business at Ryerson Polytechnical Institute, argued that mega-projects can be used by governments to build Canadian enterprises, helping them develop the high value-added, highly technical, knowledge-based products and services needed to be competitive in global markets. In 1986, a consortium of Canadian engineering companies and hydroelectric utilities won a competition to conduct feasibility studies on the Three Gorges hydro-electric mega-project in China, which would be the largest facility of this type in the world if constructed.

The element of technological achievement, combined with the magnitude of the undertakings, becomes imbued with an almost mythological stature in some cases, and mega-projects become symbols of Canadian national or provincial strength. Aitken (1959) argued that the national government, considering options for the construction of a transcontinental railway after Confederation, toyed with the idea of a series of incremental

McLeod Young Weir and then head of the C.D. Howe Economic Research Institute - was appointed head of a national Advisory Committee charged with preparing a strategic plan for the federal government's energy policy. Marcel Masse, then Minister of Energy, is an old Lavalin Inc. employee, and vigorously supported a policy of mega-projects on the Canadian frontier to meet Canada's future energy requirements and to 'supply true energy security'.

expansions to keep up with the moving frontier of settlement. However, this option " ... never caught the public imagination in the way the more ambitious project ... " of the transcontinental railway did (Aitken 1959, 206), and it was the transcontinental option that was undertaken in the early years of nationhood. This project became a symbol of the nation.

Excellent examples of the mythological stature of mega-projects can be found in recent commentary on the James Bay II and Hibernia mega-projects. In one newspaper article, the James Bay project was described as

... the stuff mythologies are made of. The dams are bigger than mountains, and they create reservoirs the size of the Great Lakes.

Building the northern dams is part of Quebec folklore ... 'going up' to work on the dam site (has been) a rite of passage of sorts for three generations ... creating strong bonds within Quebec ... (and) recuperating a lost sense of collective pride ...

Hydro Quebec is 'the' Quebec success story ... (we are) the best in the world in that field ... (we) sell our power to the Americans, send our technicians to fix their systems when they fail ... (and) export know-how in twenty-five countries ...

(The second phase of James Bay) will impress on Quebeckers a sense of achieving a significant, collective destiny. (Globe and Mail, 14 March 1988, A5).

Speaking about the meaning of the Hibernia mega-project for Newfoundland, Premier Peckford said

Hibernia means breaking the cycle of dependency. It means bringing quality jobs into Newfoundland rather than people moving away from home in search of work ... The next generation of Newfoundlanders and Labradorians will be free once and for all, free from the agonizing choice to stay in poverty or leave for prosperity, free from having to leave home, leave family and go off to live in another part of this world to earn a living. (Globe and Mail, 19 July 1988, A1).

Another important source of mega-projects' symbolic meaning is the belief that they meet national priorities of a defensive or protective nature. The latest round of energy mega-projects, with high levels of financing provided by the federal government, were often justified by such an appeal. Marcel Masse, then Canada's Minister of Energy, stated in 1987 that Canada was entering a period when mega-projects would dominate energy production, providing "true energy security for Canadians" (Globe and Mail, 6 November 1987, B4). Donald Getty, Premier of Alberta, said that development of Canada's oil sands is the best assurance that "the noose of foreign-dominated oil supplies will never tighten around Canada's neck." (Globe and Mail, 26 September 1988, B10). The security of supply argument is essentially a protective one; the argument for a mega-project can also take on defensive tones. Gamble (1987) in his review of the GRAND Canal mega-project proposal, quotes Thomas Kierans, the major proponent of the mega-project, as saying that Canada must negotiate a water export agreement with the United States while it still has the option: "Of course, the United States will not simply come and grab our water. They'll find another rationale - like saving us from the Russians." This suggests that if Canadians do not occupy their territory they will lose it to another nation. Gamble (1987) argues this is a powerful emotional appeal based on fear that bypasses proper evaluation and assessment procedures and stampedes the decision-making process. Further, Gamble suggests this kind of rationale for proceeding with mega-projects is not uncommon and extremely dangerous.

A number of characteristics of mega-project planning processes can be developed from the characteristics of mega-projects described above, and the insights of the staple thesis and related investigations that were elaborated in previous sections of this Chapter. First, we would expect governments to be involved, and that the dominant tone of this involvement would be to facilitate the mega-project proceeding. This is underpinned by the perception that resource development is equivalent to economic development, and the forces

supporting a staple mentality such as the strength of staple sector entrepreneurship and the tendency to attribute aggregate economic growth to staple production. Doern's (1983) analysis of the national government's emphasis of mega-projects in the early 1980's suggested that despite their consequences for economic development, this strategy was not produced from a policy-making process that had economic development as its primary concern. Energy was the primary policy emphasis of the federal government and the mega-project strategy was rooted in this policy framework.

If the mega-project is initiated by the private sector, the mega-project's magnitude, risk and frontier location may encourage the private sector participants to involve the government. The governments' preferred form of involvement may be in providing access to the natural resources by improving transportation or other infrastructure, or by implementing policies that reduce the cost of the resources themselves. This is an accepted form of government support for staple production in Canadian society, and has in the past led to huge economic expansion. The existence of a staple mentality, combined with the pathological nature of social memory (Bryant 1982), will tend to emphasize past successes rather than failures with this form of government support and reinforce the government's preference for transportation-oriented involvement. If access is not an issue, governments may still be directly involved by contributing equity capital, although indirect involvement is more likely because of the rentier philosophy within the state.²¹ Indirect involvement may focus on provision of subsidies to the project or other mechanisms that reduce the cost of the resources, thus lessening the risk for the private sector participants.

Government involvement in these projects may be perceived as a key factor in whether the mega-project will proceed, and this may create a tendency within government to regard the

²¹ The conflict created within government by the clash between its business and regulatory functions mitigates against government's becoming shareholders in these projects (Nelles 1974).

mega-project as a province-building or nation-building exercise. Government communications to the public about the mega-project may emphasize its symbolic meaning, and the size and urgency of the mega-project may affect which aspects of its meaning are most emphasized. The technological meaning will be important in almost all cases, and the province-building or national security meanings may only be emphasized if the mega-project is the subject of much critical discussion in the media, if the negotiation or decision-making process appears to be stalled, or if the process appears to be favouring a decision to terminate the project. The traditional role of government as a facilitator of staple production, and the symbolic meaning attached to the mega-project may strongly, and fundamentally, influence the definition of the public planning problem and the focus of any public planning process.

Second, mega-projects may amplify the tendency of political processes to produce decisions that favour concentrated interests within society rather than the larger public interest. Potential benefits from mega-projects are concentrated, yet public costs are widely spread through the general taxation system. Therefore, the public as a group may not get involved in the planning process. A broader debate on the mega-project and its contribution to economic growth and development does not occur, and so private sector interests, along with the interests of politicians and bureaucrats, may dominate the planning process. The public interest may not be defended by its traditional representatives, the politicians and the bureaucrats. The opportunities a mega-project offers to a bureaucracy to expand its power and expertise are overwhelming, and politicians gain opportunities for highly visible public exposure in actions that apparently contribute to economic growth and development. These forces may also have an important influence on how the planning issues are defined, on how the planning process is structured and implemented, and on the eventual decisions taken. The process may be

biased towards dealing with issues identified as potential constraints on the mega-project proceeding.

Third, the complexity and uniqueness of mega-projects will encourage governments to design *ad hoc* planning processes conducted within a temporary institutional and organizational framework. The mandate of the temporary agency or task force created to conduct the planning process will be given to it by political or organizational actors who have a strong interest in the mega-project proceeding based on the enormous short-term benefits, political capital, or organizational prestige they generate. This also suggests there will be a tendency to restrict the planning process to relatively narrow concerns, and not allow broader policy issues to be addressed. The technological, organizational and institutional complexities and uncertainties of mega-projects may reinforce this narrow focus. When a high level of uncertainty is apparent, planners may focus on problems that can be analyzed or solved with the application of technical rationality (Diamond 1984). The emphasis on technical or analytical rationality may elevate experts to an important position within the planning process, reinforcing the prestige opportunities presented to bureaucrats.

The tendency to create *ad hoc* planning processes also means that, once the process is terminated, the expertise and experience achieved by members of the planning team becomes diffused within the bureaucracy and other supporting organizations. For numerous reasons, these individuals may not be involved in the next mega-project planning process. For example, it may occur many years later and the individuals may have moved on to other opportunities, or it may occur in another jurisdiction. However, creating a permanent agency responsible for mega-project planning may not be an appropriate response as this may lead to a rash of mega-project initiatives (Payne 1987).

Fourth, as the purpose of most mega-projects is to meet external demand for the staple, the issues in the planning process may be closely aligned to the interests of foreign consumers, rather than regional residents. A major concern in mega-project development is provision of a product for the international market, and so potential obstacles to meeting this objective may dominate the planning process. Regional development concerns may be given inadequate attention in the planning process, and given the capital intensive and highly specialized nature of most mega-projects, few of the economic benefits associated with the mega-project may accrue to the local population.

Fifth, domestic interests in the private and public sector that are involved in the planning process may be overly optimistic. The enormous risks and uncertainties that are a fundamental characteristic of mega-projects may be under-estimated by the participants. Problems of inadequate information may be ignored, and public discussions of risk may be absent. The effect of these optimistic expectations may be imprudent decisions, based on poor evaluation, by domestic interests. Excessive optimism may extend to non-domestic participants, but it is unlikely that the optimism will be rooted in the same factors that drive its creation in the staple-based economy.

Optimistic expectations may be amplified by the zealous activities of the mega-project's 'prophet'. Bryant (1982) observed that, of 100 big dam projects around the world, most had a visionary personality associated with them. This person was generally responsible for selling the mega-project, which was done through persistently zealous behaviour based in extreme optimism and in many cases blind faith. Bryant argued that, in most cases, the prophet was able to transmit this excessive optimism to many other participants as support for the mega-project grew. This may reinforce the tendency for imprudent decision-making to occur.

Sixth, the planning process may focus on maximizing the mega-project's short-term economic benefits and minimizing its short-term costs. The high visibility and discrete nature of mega-projects, combined with the enormous short-term benefits they promise, mesh well with the short-term orientation of politicians. Combined with the rentier philosophy and potential inexperience of governments in resource policy issues, little planning attention may be directed towards maximizing the medium or long-term benefits of the project, or to minimizing the medium or long-term costs. Thus, economic development benefits which require a longer-term perspective, such as creation of linked industries or investment of resource rents in diversification initiatives, may receive little attention in the planning process. In addition, after the construction of the mega-project is complete, the government may lose interest in it as other issues may attract the government's attention.

Seventh, strong momentum may build within the planning process for a positive decision to proceed. The long time frame generally involved in a mega-project planning process and the significant investment of resources by all participants form the basis for this growing momentum. For the politicians, the high visibility and short-term economic benefits of the project may generate enormous political benefits despite the risks and long-term potential costs. This may cause politicians to associate their reputations with the success of the project, measured by a decision to proceed and the actual construction of the project. The private sector participants will have spent enormous resources coordinating and organizing the consortium of companies involved, and on feasibility studies and government lobbying. They also may have considerable prestige tied up with having the project go ahead because of the size and technological challenges it presents. The planning task force may invest significant efforts in solving the problems presented by the mega-project, and individuals within the agency as well as the agency itself may have significant prestige associated with being involved in a unique and challenging undertaking. If the planning agency is a

permanent agency the tendency to undertake projects that make the agency grow is another factor contributing to momentum.

This growing momentum and commitment of participants may produce a tendency to proceed with the planning process even in the face of strong criticism. Mackintosh (1923, 13-14) argued that

As first put forward, the Canadian Pacific project was an audacious, even foolhardy attempt to bridge the gap between Ontario and British Columbia: and from that point of view the gloomy prophecies that the road would not pay for its axle-grease were "safe and sane" judgements.

Nevertheless, the CPR went ahead and was completed. Mega-projects today face similar criticisms and proponents exhibit the same dogged determination to proceed. Thomas Kierans argued that the GRAND Canal project, whatever the criticisms, is the only way that the water problems of North America can be addressed (Gamble 1987).

Agencies charged with building mega-projects (or planning them) may exhibit a strong tendency to turn inwards and focus on the task at hand. Gerard Prevost, Vice-President at Hydro-Quebec, attributed the success of the first phase of the James Bay hydroelectric complex to the

... marvelous mix of individuals who rallied around a single goal: "Development of the La Grande Complex."

"The team of great challenges," as it was often called, succeeded in overcoming, one after the other, all the stumbling blocks encountered in that hostile region. (Prevost 1986, 18).

Growing momentum for a positive decision suggests the excessive optimism associated with staple investments may not be checked by rational analysis and may in fact be magnified. There may be a tendency to discount contradictory evidence, proceed in the face of criticism and justify proceeding by referring to the symbolic meaning of the mega-

project. All participants may be concerned to avoid the failure represented by a decision to stop the mega-project, and thus may not be interested in a critical evaluation. However, there will be considerable emphasis within the planning process on resolving engineering and design issues, and other factors that could lessen the short-term benefits and profile of the mega-project.

Eighth, there may be conflict in the negotiations among the participants. The huge capital requirements of mega-projects suggest that the normally concentrated interests associated with staple production will be even larger. However, this may be balanced to some extent by attempts to spread risk by increasing the number of participants. The negotiations among all these participants may be difficult and there may be significant conflict because each participant will have a different perception of the project, based on their varying portfolios of opportunities. Those participants who assign the mega-project a high priority may become frustrated with those who assign it a lower priority. As Bryant (1982) points out, this often involves a conflict between different levels of government as regional governments naturally assign the project a higher priority than national governments.

Ninth, governments may be low on the learning curve, and thus possess little in-house knowledge and expertise regarding the staple industry, markets, mega-projects, mega-project planning processes, or the bargaining processes around mega-project developments. This may disadvantage governments in any negotiations with private sector interests, as their existing expertise may be inadequate to support a strong bargaining position in the numerous and complex issues that must be settled, such as the nature of government involvement or options for collecting resource rents.

Tenth, the mega-project's contribution to economic growth and development may be less than projected. The tendency for governments to adopt a rentier philosophy, once past

their involvement in providing transportation access to the natural resources, may not produce effective public intervention to counter the forces that thwart development of linkages in the staple-based economy. Backward and forward linkages may not develop to the extent possible in the domestic economy, and fiscal linkages may be far below their potential. In addition, new issues may arise on the government agenda after the construction phase is over, which may divert attention from the longer-term issues of linkage development.

Finally, as problems develop with mega-projects the interest groups created by the project may successfully demand ongoing public subsidies to maintain the operation of the mega-project. These subsidies will be incurred at the expense of the general taxpayers but because of the diffused nature of these financial costs, compared to the concentrated nature of the benefits, subsidies will probably be given.

These eleven characteristics are grouped into five planning process components, summarized in Table 2.2, to simplify and clarify the analytical framework. In the following chapters, these planning process characteristics will be investigated in more detail in a case study of British Columbia's North East Coal Project.

TABLE 2.2
SUGGESTED CHARACTERISTICS OF NATURAL RESOURCE MEGA-PROJECT
PLANNING PROCESSES

Process Component	Suggested Characteristic
Role of State	Facilitator, preferring infrastructure role or other indirect participation to cheapen cost of staple production. Also could be involved in market development or protection.
Institutional and/or Organizational Framework	Ad hoc, temporary Technically-oriented
Focus of Planning Process	Narrowly-defined issues, focusing on technical constraints: closely aligned with interests of producers and purchasers. Emphasis on maximizing short-term benefits and minimizing short-term costs.
Dynamics of Process	Growing momentum; overly optimistic expectations; risk and uncertainty underestimated; planning agency turns inward and focuses on completing the process; mega-project's 'prophet' is active and influential; process may continue despite strong criticism or changing external circumstances; conflict among participants occurs; the government may be in a poor bargaining position
Outcomes	Mega-project's contribution to economic development may be less than expected; the strong interests created around the mega-project may lobby successfully for public subsidies; planning expertise is diffused as ad hoc organization dissolves; government attention shifts to new issues.

CHAPTER THREE
THE NECP: HISTORY OF THE MEGA-PROJECT
AND DESCRIPTION OF THE PLANNING PROCESS

3.1 INTRODUCTION

British Columbia's economy has been dominated by a succession of staples. Provincial governments have consistently promoted rapid economic growth through the exploitation of the province's natural resources. In the post-WW II period, the role of the state in BC's economic development was seasoned with the province-building¹ objectives of WAC Bennett who was Premier for twenty years. As Robin observed,

Bennett turned the eyes of the masses outward, towards the glittering Eldorado ... towards the entire central and northern Interior ... (the government joined) the masses with the companies in a grand assault on the primordial frontier, that great northern and central Interior burdened with mountains of untapped resources. (Robin 1972, 191).

Despite Bennett's avowed preferences for market-based approaches (Crawford 1983), his government intervened substantially in the economy to encourage resource exploitation and rapid economic growth. Large blocks of resource rights were granted to private companies, such as Alcan and Wenner-Gren, on the condition that these companies develop the resources to levels considered adequate by the provincial government (Robin 1972), private electricity companies were nationalized and consolidated to facilitate the government's plans to develop huge hydro-electric projects (Payne 1987), and the British Columbia Railway was used to open up the central and northern interiors of the province (Tomblin 1985; Gamble 1972).

¹ Province-building is motivated by desires to strengthen the provincial government's control over provincial territory, build a better-integrated provincial society, and increase the aggregate size of the province compared to other provinces (Tomblin 1985).

Gunton (1981) argued that BC governments have exhibited classic behaviour for a staple-dependent region: they have provided cheap energy, low rail rates and an extensive highway infrastructure; they have sold the province's resources at well below their market value and collected little of the rents generated; they have failed to encourage linkage development with the result that the economy imports most of the goods required in the resource sector and exports a large proportion of resources in unprocessed form; and they have distributed resource revenues to the population through expenditures on government services. This pattern becomes self-reinforcing. To maintain a high level of services, growth in government revenues is required which means the government must collect more revenues from existing businesses and/or people, or create new revenue sources. The former alternative, a combative and politically dangerous option, is avoided. Governments requiring growth have turned to new staple production again and again, regardless of their economic merit (Payne 1987, 33). Marchak argued that

Far from learning the lessons of the past, the provincial government is apparently bent on repeating them ... it may be that the decline of the green gold (forestry) industry is the necessary beginning for a shift away from the "get rich quick" mentality of British Columbia's first century toward a more mature planning of the economy which will sustain the population and preserve the natural environment for future generations. (Marchak 1983, 27).

In the 1970s, BC's economy, like the nation's, was plagued with stagflation. William Bennett, Premier of British Columbia between 1975 and 1986, in his statement to the 1978 Federal-Provincial Conference on an Economic Strategy for Canada, listed the symptoms of Canada's economic difficulties as:

... high unemployment, high levels of inflation, poor domestic investment performance, movement abroad of Canadian investment, stagnant consumer spending, declining competitiveness in international markets, and poor labour/management relations. (Bennett 1978a, 7).

In a supporting document to Bennett's position paper, control and ownership of natural resources was identified as the principal instrument by which provinces can pursue their

economic development objectives (Bennett 1978b). In BC, coal was perceived as the natural resource that could boost the provincial economy into a new period of rapid economic growth. The circumstances underpinning that perception are reviewed below.

The Rise of Coal

Despite auspicious beginnings in several areas of the province in the early 20th century, coal mining was nearly non-existent by the mid-1950s. However, in the 1960s the explosive growth of the Japanese steel industry (JSI) stimulated a dramatic resurgence in coal mining in BC. Steel production in Japan increased from 0.6 MMT in 1946 to 119.3 MMT in 1973. This phenomenal growth placed Japan third in steel production behind the USSR and the USA (Anderson 1987). Further, the rapid growth was projected to continue. Echoing other forecasts at the time, a BC task force on coal projected that Japanese steel production would reach 190 MMT by 1990 (BC 1976a).

The JSI achieved this remarkable growth despite the severe handicap of having almost no domestic production of the raw material inputs required for steel-making. Over 90% of the JSI's coking coal requirements had to be imported. Not surprisingly, as the JSI's steel production grew, so did its coking coal imports and Japan is now the largest coking coal importer in the world, purchasing about half of total metallurgical coal exports.

The JSI's costs for raw material imports were initially very high as they had to be shipped long distances (D'Cruz 1984). To reduce these costs yet ensure security of supply, the JSI undertook a number of initiatives to reduce a) the total amount of raw materials required for the steel-making process, b) the cost of shipping the raw materials, and c) the purchase price, or Free-On-Board (FOB) cost, of the raw materials (D'Cruz 1984). One of these initiatives was an aggressive sourcing policy, including quasi-integration with suppliers

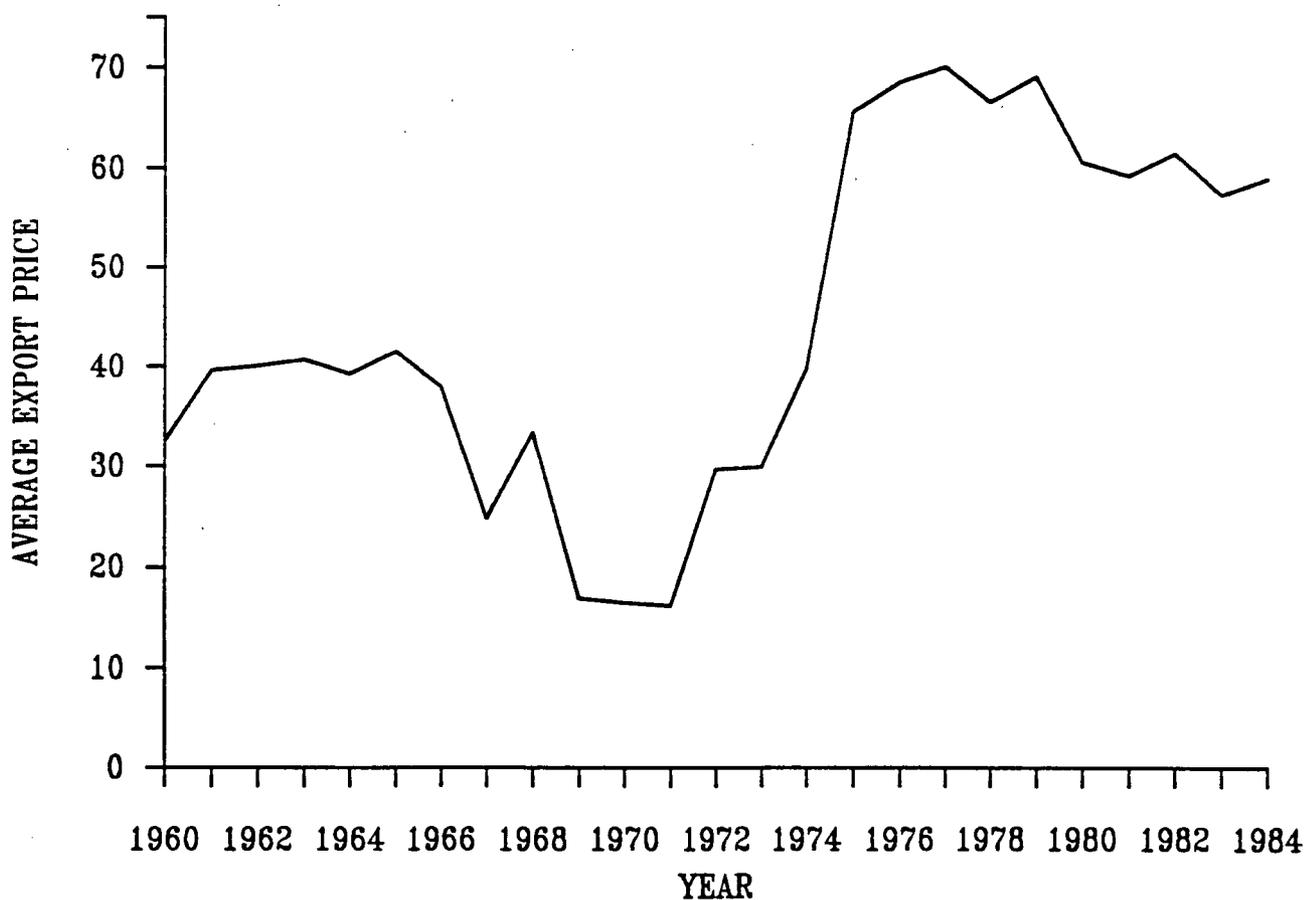
and coordinated purchasing of inputs. The JSI also encouraged large-scale mining projects in the expectation that scale economies would bring down the cost of production (D'Cruz 1984).

As a result of these deliberate efforts, the JSI diversified their suppliers of coking coal. From 1947 until 1972, the JSI sourced most of their coking coal from the USA. However, after 1972 Australia became the lead supplier, now meeting between 40% and 45% of the JSI's coking coal requirements. Canada follows with 20% to 25% of the JSI market, and the USA suppliers now only provide about 20% of the JSI's requirements (Anderson 1987).

In encouraging new mine developments, the JSI pursued quasi-integration, providing capital assistance and negotiating long-term contracts with new mining projects. In some cases the JSI even took minority equity positions in these ventures, following the 'Develop and Import' policy advocated by the Japanese government as a way to ensure new supplies were developed (D'Cruz 1984). The JSI's sourcing and quasi-integration strategies had a significant impact on BC's coal industry.

In the mid-1960s the JSI signed short-term (3 year) contracts for metallurgical coal from southeastern BC that totalled 1 MMTPY of supply. By the late 1960s, the volumes and the time frames of the contracts had greatly expanded as the JSI implemented their strategies for encouraging larger-scale production. Balmer and Fording started large-scale production in 1970 and 1972, respectively (BC 1976a). Many start-up difficulties were experienced by these mines, resulting in cost overruns and lack of competitiveness. However, after 1973 a boom in coal prices occurred (Figure 3.1); Canadian FOB prices climbed from \$32.46/MT (1980\$C) in 1960 to \$65.60/MT (1980\$C) by 1975. This price change moved the southeastern coal mines into very profitable positions.

FIGURE 3.1
AVERAGE METALLURGICAL COAL EXPORT PRICES,
CANADA TO JAPAN, 1960-1984
(1980\$/MT FOB)



Source: Statistics Canada, Coal Mines, various years.

Growth in coking coal prices continued in the early 1970s. The JSI expressed an increased interest in obtaining additional supplies from BC, and a number of proposals for expansions and new mining projects were put forward. Production from the southeastern region of BC increased 27 fold between 1969 and 1984, going from 550 thousand MT to 21 MMT (BC 1986). In the 1970's, coal became one of the top three minerals in BC in terms of the total value of production, and in 1984 coal became the leading mineral in the province, representing approximately 30% of the total value of provincial mineral production that year (BC 1986).

The rise of coal in BC was auspicious. The province's forestry and metal mining industries were maturing, and thus losing the capability to stimulate rapid economic growth. Coal might provide a new economic base for BC. Premier Bennett expressed such a view when he introduced the Province's new coal policy.

I believe that the economy of this Province will be significantly influenced by coal during the next decade, and that coal could eventually outrank the lumber industry in employment, resource revenue and taxation. (BC 1977c, n.p.).

The province's coal resources were enormous, and coal had significant and tantalizing economic linkages to manufacturing. The provincial government set about preparing the institutional framework required to encourage and facilitate coal as BC's new growth pole. A new coal policy was developed and guidelines for coal development were established.

The province's new Coal Policy (BC 1977c) firmly established the government's general philosophy towards developing the coal resource. Premier Bennett, announcing this policy, expressed it succinctly.

This policy establishes a framework within which this vital natural resource will be developed for the maximum benefit of all British Columbians.

The Government has consistently said during the past 18 months that its coal policy would be one that would ensure the development of the industry by private enterprise with the Government providing the climate and the facilities. This policy that I am announcing today does exactly that. (BC 1977c, n.p.).

The objective of the Province's Coal Policy was to maximize the economic and social benefits to BC and Canada of coal development. In a series of statements, the Coal Policy set out how this would be achieved.

The development of the coal resources of British Columbia must be consistent with overall Provincial energy, economic, environmental, regional development and social objectives.

To maximize Provincial benefits, the use of British Columbia expertise and resources in coal development will be stressed and encouraged. Where such services are initially lacking or deficient in the Province, the coal industry, trade and professional organizations, and government institutions and agencies will be encouraged to develop the requisite skills and facilities within British Columbia.

... to ensure that opportunities to maximize the attainment of Provincial social goals in coal development are realized, careful attention to manpower training and project planning will be mandatory. *The government will therefore coordinate manpower planning activities ...* (BC 1977c, n.p.; emphasis in original).

The Coal Development Guidelines were the primary institutional arrangement through which the Province would ensure that its policy objectives were achieved.² The Guidelines, introduced in 1976, were intended to introduce a rational planning process for coal

² The Guidelines identify the numerous provincial government interests and public concerns with coal and related developments, establish a procedure for the developer, government and public to assess and manage all major impacts, provide procedural direction for impact assessment and management, and specify the types of information required by the provincial government for the review of permit and licence applications. The project appraisal process described in the Guidelines is coordinated by a Coal Steering Committee comprised of representatives from the Department of Mines and Petroleum Resources, the Department of Economic Development and the Environment and Land Use Committee Secretariat. The appraisal process consists of four stages, designed to encourage ongoing dialogue between the project proponent and government agencies with social, economic and environmental responsibilities.

development that would ensure new mines or expansions would smoothly fit into a region's future development (BC 1976a). The introduction to the Coal Development Guidelines illustrates this philosophy.

Major resource developments such as coal mining and processing will change environmental, social and economic conditions in the region of development. Careful planning of large-scale coal developments is therefore necessary to ensure that a rational approach to managing land use, environmental and community impacts is undertaken prior to final decisions on coal and related developments being made. (BC 1976c, 3).

In fact, the Guidelines were apparently intended to ensure that coal projects followed regional development goals and plans, rather than vice versa. The Coal Task Force described the Guidelines as

... a planning tool that shapes the whole development program from its inception to be responsive to the economic, social and environmental goals of the region's development. (BC 1976a, 120).

Clearly, the province expected coal to play a major role in the province's economic future, and wanted to ensure that the maximum benefits for British Columbians would be achieved. The relationship between coal development and the Province's economic objectives was explained in the publication British Columbia Coal Development (BC n.d.). The Province's economic objectives were: full productive employment, growth in real incomes, stability of employment, incomes and prices, and more balanced regional development (Malkinson and Sivertson 1978; BC n.d.). Coal development would meet those objectives by providing direct and indirect labour benefits, growth in personal incomes, government revenues, economic diversification, and regional development (BC n.d.).

When coal prices increased in 1974, the rush of proposed mining projects that appeared were not all in southeastern BC. In fact, a large number of the proposed mines were in

northeastern BC, an area that had little previous mining activity. During the 1970s, the government created a unique planning process to examine the viability of opening up a second major supply area in the province, and it is to an examination of this planning process and the events surrounding it that we now turn.

3.2 HISTORY OF THE NECP

The Peace River coalfield is located in northeastern BC, running along the Rocky Mountain foothills from the Alberta boundary in the south to the Prophet River in the north (Figure 3.2). The potentially mineable coal seams vary considerably throughout the coalfield in number and thickness. As many as 16 seams have been indicated, varying from 3 to 30 feet in thickness. The coals are generally medium-volatile bituminous types, with high calorific content and usually low sulphur content. Many of the coals have excellent coking qualities (BC 1976a), and are similar to the metallurgical coal produced from the Balmer Mine in southeastern BC.³ Coal reserves in the Peace River coalfield were estimated by the province to be 336 MMT, with indicated and inferred resources approaching 8,091 MMT⁴ which represents approximately 25% of the province's inferred and indicated coal resources (BC 1982a). By the mid 1970s, there were fifteen coal properties in various stages of development (Figure 3.3).

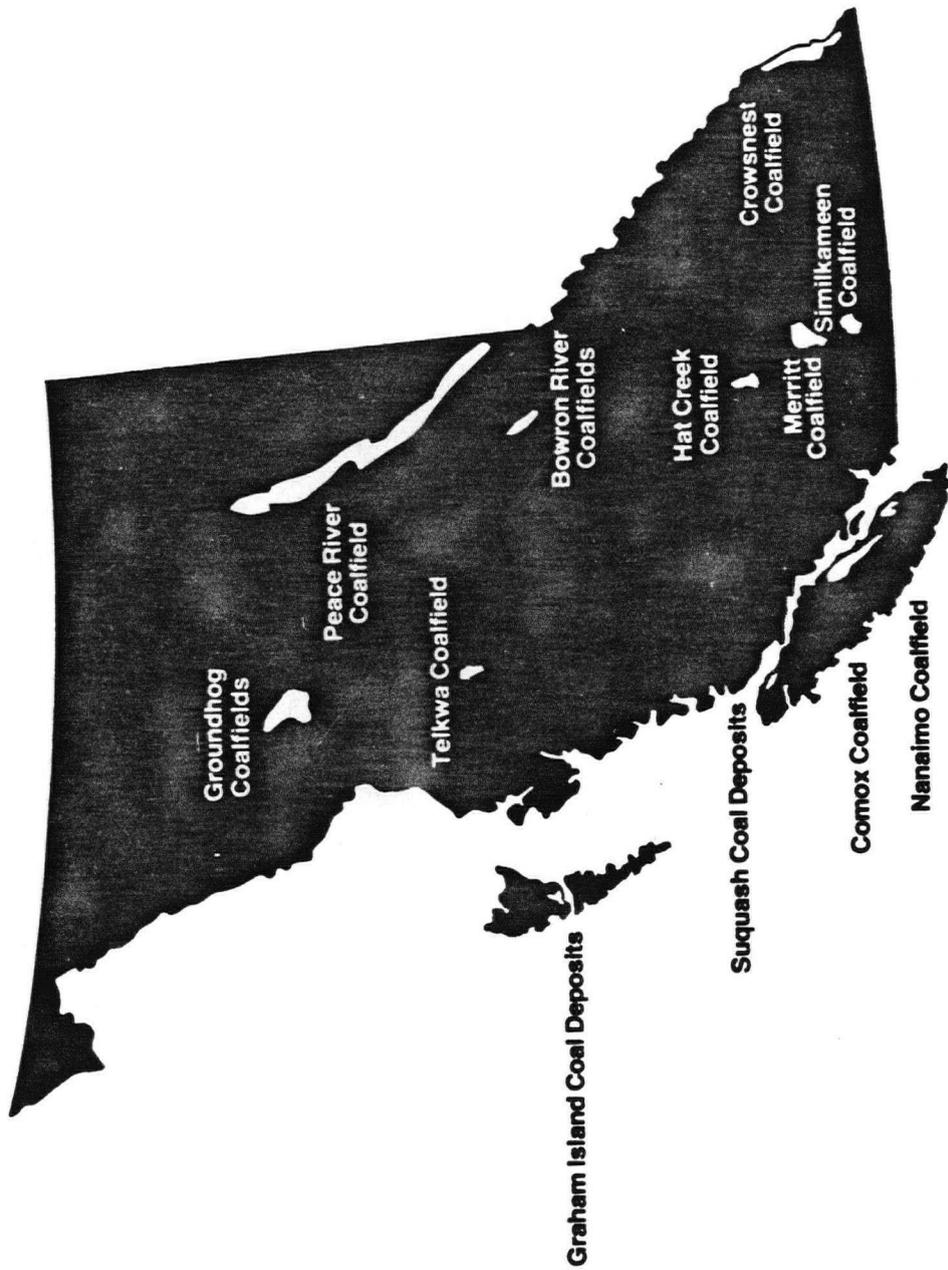
Prior to the 1970s there was almost no coal mining activity in the Peace River coalfields. During the early 1970s, the Coalition Mining Company commenced initial exploration work on the Sukunka property, and Denison Mines Ltd. and Alco Standard Corp.

³ The prices received by Balmer Mine can be used as a proxy for the competitive price for coal from northeastern BC. The quality of coal is approximately the same, and Balmer's contract with the JSI is renegotiated annually and thus reflects current market conditions.

⁴ Measured reserves have been estimated from field measurements that have defined the thickness and extent of coal so well that the computed quantity is judged to be within 20% of the true quantity. Inferred and indicated resources are estimated from broad knowledge of the geological character of the region or coal bed, and may be combined with some field measurements.

FIGURE 3.2

COALFIELDS IN BRITISH COLUMBIA

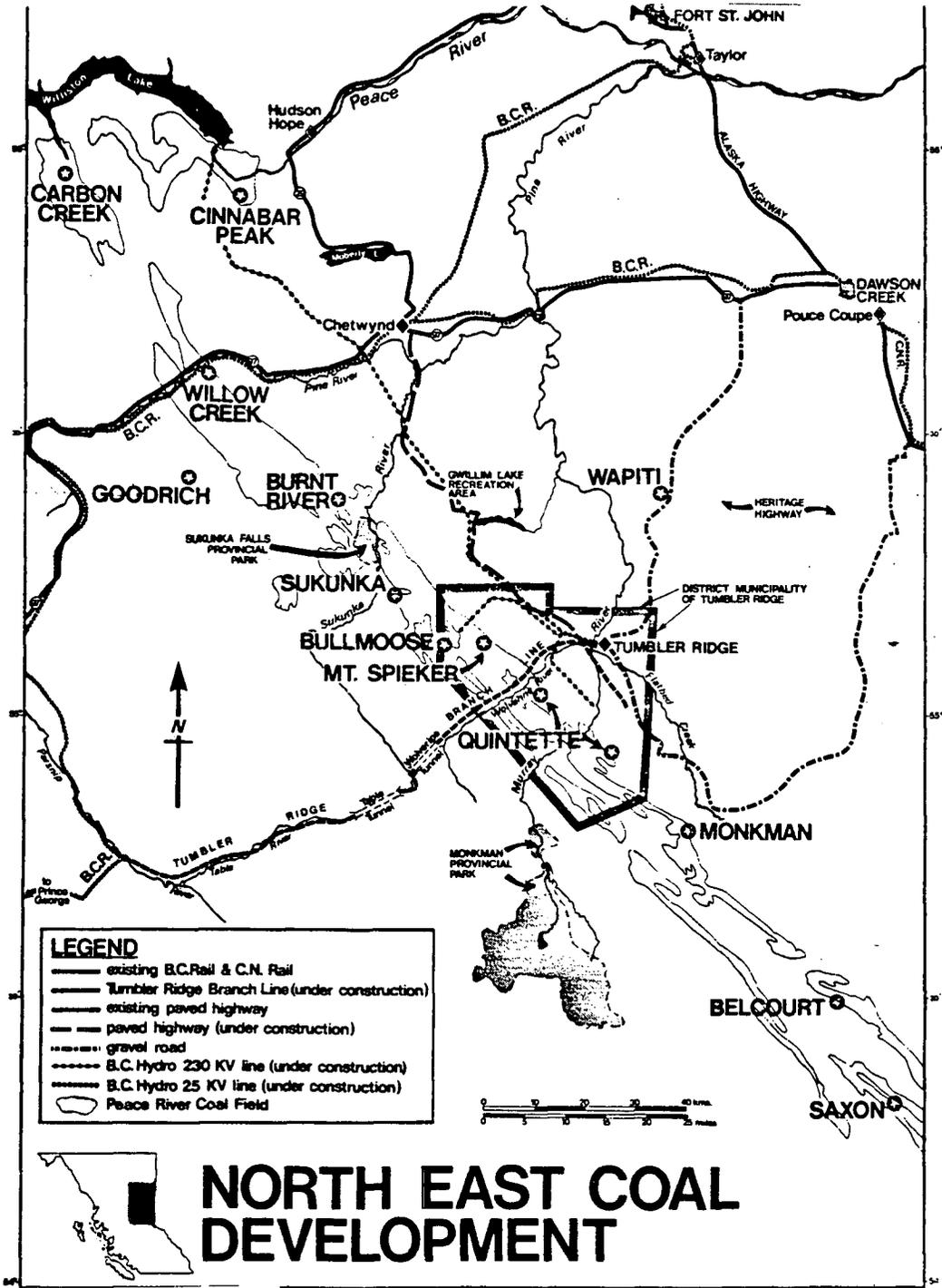


Source: BC (n.d.)

FIGURE 3.3

POTENTIAL COAL PROPERTIES

IN THE PEACE RIVER COALFIELD, BC



Source: BC (1982a)

announced an agreement-in-principle with two Japanese companies (Mitsui Mining Co. and Tokyo Boeki Ltd.) to conduct a feasibility study on the Quintette property. Successive provincial governments expressed interest in establishing coal mining in northeastern BC, and at this time, apparently favoured shipping the coal from Chetwynd to Vancouver over existing BC Railway lines, and out through the existing coal port facilities in Vancouver. Little infrastructure investment or government involvement was required.

In 1974, the price for coal from the Balmer Mine in southeastern BC increased by approximately 50% in nominal terms to \$30.92/MT FOB (1974\$C). In the same year, the provincial Ministry of Economic Development conducted a study of economic development prospects in BC's northeast region.⁵ The results of that study (BC 1975) suggested that sustained future expansion of the region's population and local economy lay with the exploitation of the region's natural resources, particularly coal. The magnitude of the Peace River coalfields and the rapidly growing demand for coal indicated that this resource could provide a major opportunity for regional economic development and diversification (BC 1981b, 9), with coal serving as a catalyst for the future growth of the transportation, construction, trade, and services sectors in the regional economy. The study authors cautioned that development of the coal resource would require detailed and careful planning to ensure that the maximum economic benefits were achieved while at the same time minimizing adverse social and environmental impacts.

In 1975, coal prices increased dramatically. Balmer Mines in southeastern BC received \$53.00/MT, an increase of approximately 70% in nominal terms from its 1974 price. Expenditures on coal exploration in northeastern BC increased accordingly from \$600,000 in 1973 to \$3.5 million in 1975, and were forecast to reach \$10.3 million in 1976 (Sun, 23/4/76). Quintette Coal Ltd. (QCL) secured a letter of intent from the JSI for the

⁵ This study was funded under an Interim Planning Agreement which was part of a General Development Agreement between the province and the Government of Canada.

purchase of 5 million metric tonnes per year (MMTPY), with delivery beginning in 1979 and thus requiring a construction start-up date no later than the fall of 1977 (Malkinson and Wakabayashi 1982).

In response to the quickening activity, the provincial government commissioned a Coal Task Force to undertake studies of the broad technical issues related to development of the Province's coal resources, including an inventory of resources, an assessment of future demand, an assessment of mining technology, costs and coal utilization, and an examination of coal logistics, environmental considerations and manpower and training requirements (BC 1976a). The Task Force report, released to the public in 1976, forecast continuing high growth in metallurgical coal demand, and identified a number of constraints to increased BC coal production. The major constraints were: the complex geology of the area and potentially high ash content of the coal deposits, producing difficulties in applying advanced mining technologies and in achieving economically feasible yields; the need for highly-skilled underground miners, potentially leading to a manpower shortage; and the limited capacity of existing rail and port facilities to handle increased coal shipments.

Over this time period, the provincial government's assessment of infrastructure requirements changed. Rather than shipping the coal out of the Vancouver port, the provincial government now suggested that the best transportation route would be to use existing BC Rail lines from Chetwynd to Prince George, and then to transfer to CN Rail line to Prince Rupert where a new coal port was being studied by Neptune Terminals (Sun, 2/12/75).

The continuing high level of exploration and marketing activity associated with coal properties in the Peace River coalfields prompted BC's Ministry of Economic Development

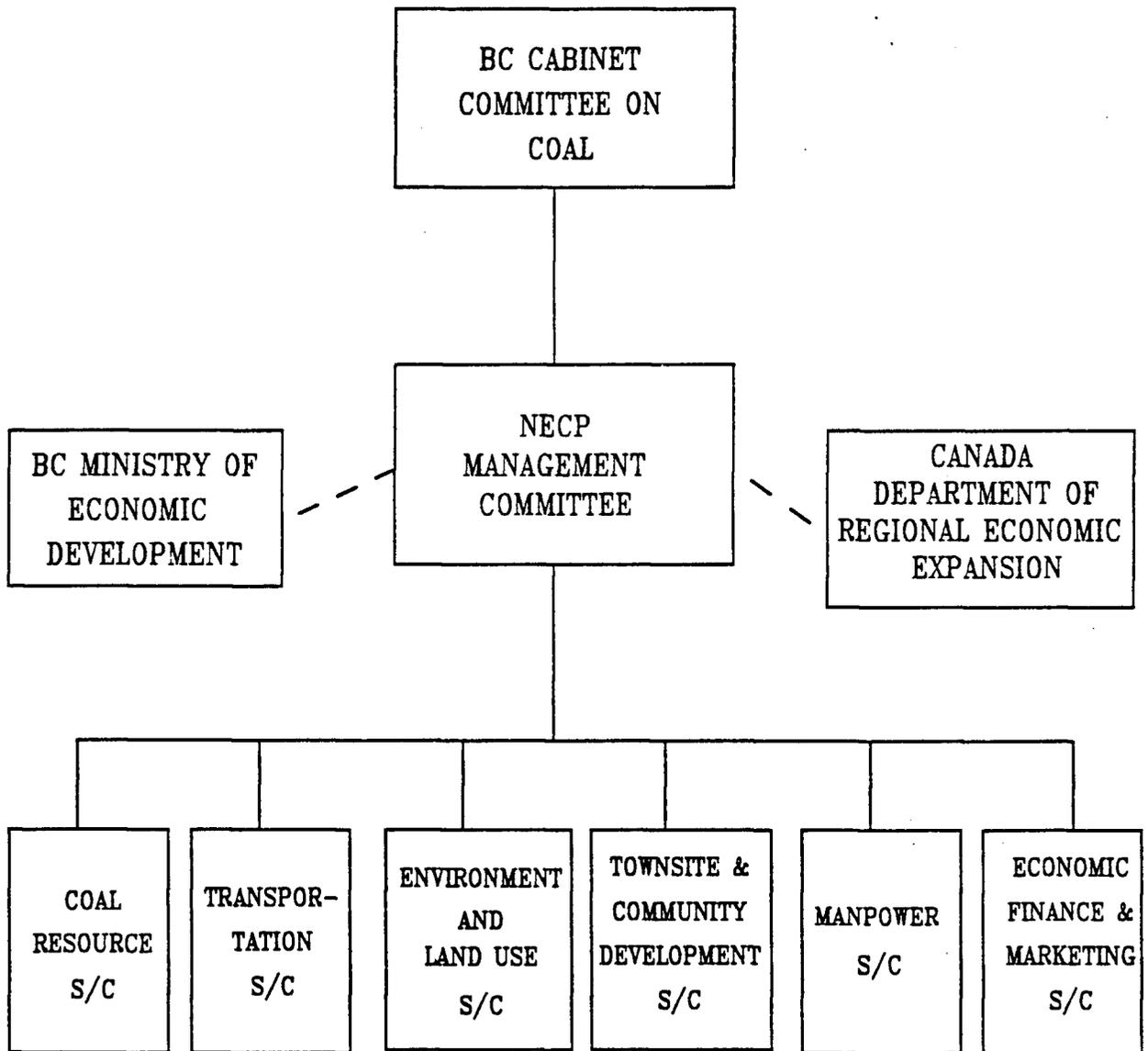
to propose an evaluation of the potential viability of North East coal development. In January of 1976, the provincial Cabinet established a Cabinet Committee on Coal and appointed Don Phillips, Minister of Economic Development and MLA for the Peace River area, as the Committee's Chair. The Cabinet Committee created five Sub-Committees to investigate various aspects of the North East coal developments; Coal Resource, Environmental and Land Use, Transportation, Manpower, and Townsite/Community Development (Figure 3.4). Each Sub-Committee, staffed by civil servants seconded from other branches of government, was responsible for developing its own terms of reference, undertaking feasibility analyses, and documenting its findings. The Ministry of Economic Development was made responsible for overall coordination of the study program, and for initiation of marketing, financial and social studies required to integrate the Sub-Committees' work into a final overall economic analysis of the development potential. A budget of \$4.5 million was allocated for the Sub-Committees' work programs for the 1976-77 fiscal year.

The Sub-Committees immediately began their work but quickly realized that the federal government's cooperation in the planning, development, and operation phases would be required because of the mega-project's magnitude and the diverse policy issues it raised. A special Subsidiary Agreement to Evaluate North East Coal and Related Developments, hereafter referred to as the Subsidiary Agreement, was negotiated with the federal Department of Regional Economic Expansion (DREE).⁶ The Subsidiary Agreement established a Management Committee and a series of Sub-Committees based on the provincial Sub-Committees, but with additional staff from the federal government.⁷

⁶ This Subsidiary Agreement was signed January 1, 1977 and committed the federal government to share \$3 million of the \$4.5 million budgeted for the fiscal year.

⁷ The new structure had six Sub-Committees compared to five because an Economics, Financial and Marketing Analysis Sub-Committee was created. This Sub-Committee took over the activities that had previously been the responsibility of the provincial Ministry of Economic Development.

FIGURE 3.4
INSTITUTIONAL STRUCTURE OF THE NECP
PUBLIC PLANNING PROCESS



S/C = SUB-COMMITTEE

As the planning task force continued with its work in 1976, provincial politicians became involved in multi-party negotiations regarding the province's potential role in northeastern coal development. BC Premier Bennett announced that coal would be the key to the continuing development of the provincial economy, and argued that putting in infrastructure ahead of demand would encourage mines to be on stream when the markets improved (Sun, 25/2/76). Nevertheless, Don Phillips stated that all the projects in the north east coal development would have to be economically viable for the mega-project to proceed (Province, 31/5/76). In late 1976, a trade mission from Japan visited Canada and emphasized that the BC government would have to provide transportation and townsite infrastructure if the north east coal fields were to be developed (Sun, 26/10/76). Phillips announced that he was negotiating with the JSI for a minimum purchase of 10 MMTPY of coal from the northeast, as this volume was required to ensure an adequate return on public funds invested in infrastructure to support coal exports (Sun, 27/10/76). In December of 1976, Premier Bennett met with Prime Minister Trudeau regarding potential financing arrangements for infrastructure improvements and additions to support the NECP (Montreal Star, 27/12/76).

Steel and metallurgical coal markets softened in 1976,⁸ and a number of signals contradicting the previous years' optimism emerged. Expert resource analysts argued that the JSI had reached its maximum production levels and would not expand very much in the future (Sun, 28/2/76), and that the high prices for metallurgical coal were temporary and would not be sustained (Sivertson and Clancy 1976). Brascan Ltd. chose not to exercise its option to purchase 60% of Brameda Resources Ltd. which owned the Sukunka property in northeastern BC. Brascan executives said they did not expect a sufficient return on capital investment to justify the company's participation in the Sukunka project (Province, 28/12/76). In early 1977, the JSI attempted to negotiate a \$7/MT price cut

⁸ Balmer Mines in southeastern BC received a very small price increase in 1976 of \$1.64/MT in nominal terms.

with southeastern mines due to the softness in steel markets in 1976 and low growth expectations for 1977 (Financial Post, 26/2/77).

Meanwhile, within the planning task force, most of the Sub-Committees' work programs were completed by February 1977; the total expenditure for the fiscal year was \$3.5 million. The summary and background studies completed during this phase of the planning process⁹ noted that the key factors affecting the viability of the NECP were a) market conditions for coking coal and resulting volumes sold and prices received, b) availability of skilled labour for underground mining, and c) technological issues related to underground mining. The studies also identified the least cost infrastructure options based on its assumptions that, at the minimum, the Quintette and Sukunka properties would proceed. These options were as follows: a new port at Ridley Island near Prince Rupert, upgrading of the CNR line from Prince Rupert to Prince George, upgrading of the BCR line from Prince George to Anzac, a new branchline from the central area of the coalfields to Anzac on the BC Rail line, a new townsite at Tumbler Ridge, a new highway from Chetwynd to Tumbler Ridge and upgrading of the Heritage Highway, and a power line from the WAC Bennett Dam to the area of Tumbler Ridge (Malkinson and Wakabayashi 1982). The preliminary economic evaluation of the NECP suggested that the mega-project was viable; a negative net present value resulted only if metallurgical coal prices were between \$56.25/MT and \$60.25/MT (1976\$C) and QCL was the only mine that was developed.¹⁰ This low price scenario assumed higher prices than those received by Balmer Mine in southeastern BC,¹¹ a mine that produces metallurgical coal very similar in quality to northeastern coals; the implicit assumption was that the JSI would be willing to pay a price premium for coal from northeast BC.

⁹ See Appendix 3B for a list of these studies.

¹⁰ This preliminary evaluation did not include any social costs or benefits, such as environmental costs, and so was closer to a discounted cash flow analysis in a financial appraisal than a benefit-cost analysis.

¹¹ The low price scenario assumed a higher price than what was actually received by Balmer Mine in southeastern BC in 1976 (\$54.64/MT).

In May of 1977, the Subsidiary Agreement was extended for another year and expanded. Despite continuing softness in steel and metallurgical coal markets, a further \$12 million was committed to comprehensive analysis and design studies which were intended to advance the planning to the stage where governments would be able to respond quickly to private sector initiatives. However, signals from the market continued to be poor. Premier Bennett's statements that coal would eventually outrank the lumber industry in providing employment, resource revenues and taxation were strongly criticized by a coal company executive in southeastern BC who argued that the government was over-estimating future growth in the metallurgical coal market (Financial Post, 17/9/77). A study of coal markets for the NECP planning task force also argued that the high prices and demand of the mid-1970s were temporary, and that there was a danger of potential overproduction of metallurgical coal in the early 1980s (Sivertson 1977).

Finally, a global recession in steel demand was recognized and the NECP planning process was re-programmed - only \$4 million of the \$12 million in committed funds were expended in the 1977-78 fiscal year. The Subsidiary Agreement was extended for two years and the remaining funds carried over to allow completion of outstanding studies over the longer time period. The recession in steel demand also caused the mining companies to re-examine their plans, and between 1977 and 1979 the mining technology to be employed in the northeast changed from operations involving part-underground, part-surface mining to all surface mining. During this period, the Sukunka property was replaced by the Bullmoose property and Teck Corporation became the major shareholder in the Bullmoose operations. The planned Bullmoose operation was a much smaller mine than the Sukunka project, (1.5 MMTPY versus 3.0 MMTPY). During this time the Quintette project was also scaled back to a 4 MMTPY operation (Malkinson and Wakabayashi 1982).

The NECP planning task force continued to monitor market conditions and to complete outstanding studies between 1977 and 1979. A market study completed in 1979 concluded there was insufficient demand in the JSI to justify the NECP proceeding. After an extensive market survey, the report's authors, Jones and Sivertson, argued

... additional coal supplies for Japan will likely first come from areas with existing infrastructure, because of cost considerations ... (Canada's) major advantage is that steel mills want to rely more on Canadian suppliers. Still, commercial considerations predominate.

There does not appear to be a consensus (in the JSI) on which new projects in Canada would likely get the nod. Size and low cost appear to be prime factors in the choice. The appropriate scale for new projects appears to be not more than 2×10^6 tonnes. A project of $4 - 5 \times 10^6$ tonnes is too large now. (Jones and Sivertson 1979, 18).

However, the authors noted that expanding steel capacity in other Pacific Rim countries could supply a market opportunity for BC coals. The provincial government attempted to improve access to potential markets, appointing a Coal Coordinator for BC to promote development of BC's coal reserves (Vancouver Express, 5/1/79). In addition, Premier Bennett and Don Phillips visited Japan in an attempt to get a firm commitment on the NECP from the JSI, but were unsuccessful (Sun, 23/10/79).

In late 1979, steel demand began to improve and, as a result, coal prices increased slightly. Balmer Mines received a price increase of \$4.28/MT to \$62.94/MT in 1980. Yet there was considerable uncertainty regarding future market conditions. Conflicts emerged within the JSI regarding the need for new coal supplies; however, the JSI were unable to agree to pull out of the NECP completely (Catliff 1985).

In April of 1980, a trade mission from Japan visited BC to discuss financial and infrastructure aspects of the NECP with provincial government officials. The trade mission allegedly set a deadline of May 30, 1980 for the infrastructure details to be finalized in order to guarantee price and volume commitments from the JSI (Province,

25/5/80). After this visit, Phillips announced that a deal with the JSI depended on government financing transportation out of the coalfields (Sun, 29/4/80). Negotiations between the federal and provincial governments regarding the infrastructure components of the NECP quickly became fractious, with Phillips complaining that the federal government's sluggishness in agreeing to a rail cost-sharing arrangement could cause BC to lose a \$500 million per year coal deal (Province, 29/4/80). The conflict continued through the visit of the Japanese Prime Minister in May, 1980. The federal Minister of Economic Development announced that BC would have to pay the entire cost of the rail link between the coal fields and the CN Rail line (Province, 5/5/80); Prime Minister Trudeau allegedly suggested that federal support for NECP infrastructure would not be forthcoming unless the Japanese purchased a CANDU reactor from Canada and BC renounced its compensation demands associated with the Alaska Highway Gas Pipeline (Province, 6/5/80; Sun, 7/5/80). Executives from QCL and BOC reported that closing a deal with the JSI depended on the federal and provincial governments reaching an agreement on infrastructure funding (Globe and Mail, 7/5/80). Finally, Premier Bennett announced that BC might have to be solely responsible for the infrastructure costs associated with the NECP (Sun, 9/5/80).

The JSI allegedly extended its deadline for the infrastructure agreements to June 15, 1980 (Province, 25/5/80). Negotiations between the federal and provincial governments continued, and the federal government dropped its requirement that BC give up its claim for compensation on the Alaska Highway Gas Pipeline. An agreement-in-principle was announced after a special meeting on June 11 between the federal and provincial governments, the CN Railway and the coal mining companies (Sun, 13/6/80). The federal government declared that the National Harbours Board (NHB) would pay the site preparation costs for the Ridley Island coal terminal, that DREE would pay for 50% of the costs of the access road to Ridley Island, and that the CNR would pay for upgrading its

line between Prince George and Prince Rupert. The BC Railway would pay for the rail link from Prince George to Tumbler Ridge (Province, 17/6/80), and the provincial government would cover 50% of the costs of the Ridley Island access road.

The JSI was concerned about the infrastructure financing and worried that BC might not recover its costs, and requested firm cost figures on rail and other infrastructure requirements before it would proceed any further in negotiations with the coal companies (Sun, 26/6/80). In addition, the JSI was concerned about the economic viability of the two mines, QCL and Bullmoose Operating Corporation (BOC), and sent a trade mission to Canada in July 1980 to obtain further information (Sun, 31/7/80).

Echoing the JSI's concerns, several independent analyses of the NECP indicated the mega-project was not economically viable. One analysis suggested coal prices would have to be higher than \$71.00/MT (1980\$C) for the NECP to generate an adequate return on capital invested. If capital costs were 20% higher than expected, prices would have to be \$75.00/MT (Livernois 1980). Another analysis argued that the JSI had signed contracts far in excess of their forecast consumption and that the small amount of additional supply that might be required from western Canada could easily be provided from southeastern BC at a lower cost than the northeastern mines (Halvorson 1980b).

Premier Bennett, responding to criticisms of the mega-project within the legislature, stated that

Mr. Speaker, the government of British Columbia is approaching this development as another stepping stone in the economic development of this province, returning to the boldness of the sixties and the great two-river policy (Hansard, 16/6/80, 2852).

NECP will mean thousands of jobs for British Columbians both in the development of the infrastructure and in the private sector, particularly in the development of mines, for those who will work in facilities, whether its in

transportation, mining or off-loading, and also the spinoff benefit of the multiplier effect on the number of other jobs that it will create for British Columbians and Canadians (Hansard, 17/6/80, 2878).

... because in fact the development of two outlets, two ports and two rail systems will help the southeast as well as British Columbia and Canada. He must know the concern that has been expressed in dealing with Canada. (The JSI) were vulnerable to a single transportation system, a single port system and a single area of coal development ... (Hansard, 16/6/80, 2852).

... this government told not only the companies in Japan but around the Pacific Rim also that British Columbia is politically stable and can be a secure supplier of resources, because we are prepared to step out and develop a second transportation system that will guarantee that security (Hansard, 16/6/80, 2852).

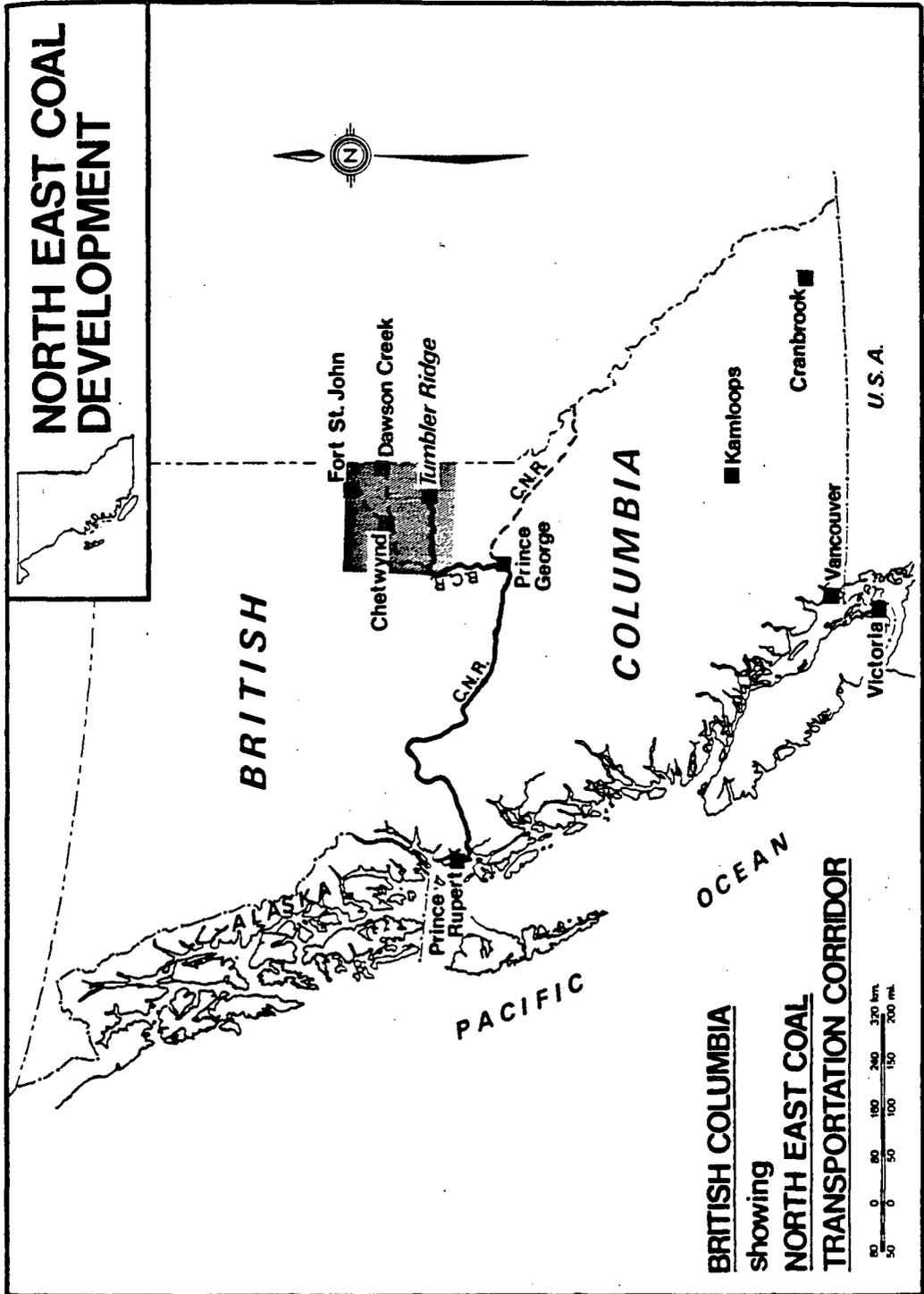
Negotiations between the JSI and the mining companies continued throughout the latter half of 1980, with the JSI countering the mining companies' initial offer of \$84.00 - \$86.00/MT FOB with an offer of \$75.00 - \$77.00/MT FOB (Catliff 1985). The coal companies announced that Australian producers were offering the JSI new coal supply at just under \$80.00/MT and so the mining companies had to reduce their offer by \$5.00/MT to be competitive. The companies suggested that this reduction could be achieved by lowering the rail freight charges and suggested that BC Rail's and CN Rail's target of a 20% return on capital invested was too high (Globe and Mail, 16/7/80). The provincial government asked the federal government to reduce CN Rail's freight charge by \$3.00/MT and agreed to a BC Rail reduction of \$2.00/MT, thus meeting the \$5.00/MT target of the coal companies, but the federal government refused (Sun, 7/7/80). In August, Nemoto, the Managing Director of Nippon Kokan and the lead purchaser for the JSI in North America, asked CN Rail to reduce its freight charge for the first five years of the operating phase (Sun, 9/9/80).

In late 1980, the JSI's interest in the NECP increased, stimulated by supply disruptions from Australia, and announcements from other Australian mine owners that they would not be able to meet contracted volumes because of insufficient port capacity in Australia (Sun, 19/8/80). In addition, steel demand forecasts were improving. The JSI sent another trade mission to BC to press for an agreement on the infrastructure financing (Catliff 1985). However, in November 1980, the JSI postponed a decision on the NECP for 6 to 12 months because of inner conflict; further information was required to allay fears of price escalation expressed by some JSI members. The JSI wanted to extend the period of guaranteed prices in the QCL contract (Sun, 19/11/80), but in return the mining companies wanted more equity investment from the JSI (Catliff 1985). The JSI's position changed again later in the month as the Australian supply disruption ended and steel forecasts began to shrink. The JSI wanted to postpone the NECP deal for two years, but Phillips told the mills he could not guarantee the same conditions and set a January 20/81 deadline for a response from the JSI (Catliff 1985).

In January 1981 an agreement-in-principle on the NECP was reached (Sun, 24/1/81), the breakthrough was created by an agreement by the JSI to take additional tonnage from QCL that would increase that mine's annual production to 5 MMT. The final shape of the NECP then emerged (Figure 3.5). Two coal mines would be developed in the Peace River coalfields. QCL would be a 5 MMTPY operation, and the smaller BOC would produce 1.7 MMTPY. The new town of Tumbler Ridge, expected to reach a population of 6000, would be built as an independent district municipality; it would be self-financing over the long term but the initial disparity between expenditures and receipts would be covered by the provincial government. BC Rail would build the 129 kilometre Anzac rail line into the coalfields and the spur line to the QCL property; BOC would truck its coal to a loading point on the rail line rather than have a spur line built into its property. The Anzac line required four tunnels, the longest being the Wolverine (6 kilometres) and the Table (9

FIGURE 3.5

THE NORTH EAST COAL PROJECT



Source: BC (1982a)

kilometres) tunnels. These tunnels were a major capital cost element and milestones in the critical path for the mega-project's construction. BC Rail would also undertake upgrading of the 125 kilometres of mainline between Anzac and Prince George and purchase special unit cars for transporting the coal. CN Rail would undertake upgrading on its 700 kilometres of mainline between Prince George and Prince Rupert and purchase unit cars for transporting the coal.¹² The National Harbours Board would cover the initial capital cost of site preparation for the coal terminal on Ridley Island; the federal and provincial governments would split the cost of building the access road to Ridley Island from Prince Rupert. The coal terminal itself would be privately owned and operated. BC Hydro would construct a 230 kV transmission line from the WAC Bennett Dam to a new substation near Tumbler Ridge, a distance of 127 kilometres. Finally, the provincial Ministry of Transportation and Highways would construct a new paved 92 kilometre highway from Chetwynd to Tumbler Ridge, and upgrade the all-weather Heritage Highway that connects Tumbler Ridge and Dawson Creek. The total estimated cost of the NECP was \$1.85 billion (1981\$C), with \$1.02 billion being invested by the private sector, and \$0.83 billion by the public sector (Malkinson and Wakabayashi 1982, 2; Price Waterhouse 1981, 13).

The provincial government was ready when the agreement-in-principle was reached, and created the North East Coal Development Office (NECDO) to coordinate the mega-project's construction and negotiate legal agreements with the various participants (Prince and Doern 1985). However, substantial criticism of the mega-project emerged from the political opposition, the media, the public, and from within government. The opposition party argued that the NECP was not economically viable and would require subsidization by the provincial government, potentially costing taxpayers as much as \$1 billion (Province, 30/1/81). A media-based critic suggested that the province's arguments that the

¹² The total amount of special rolling stock required was estimated to be 41 locomotives and 1080 coal cars.

mega-project would open up a new area of the province to resource exploitation and provide enormous regional spin-offs were unsupportable, as regional forestry resources were already being harvested at close to sustainable yields, there were few minerals in the area besides coal, equipment purchases would occur mostly in the USA, and servicing would be done out of Edmonton (Province, 10/2/81). A confidential document leaked to the press revealed that the Cabinet approved early development of the NECP despite advice that project costs might escalate uncontrollably if the project pushed ahead (Province, 10/2/81). Some residents of northeastern BC requested a public hearing, unsure of the development benefits the province said would accrue to the region (Province, 8/2/81). Finally, the Chair of the Coal Development Guidelines Steering Committee said the province was "putting the cart before the horse" in approving the NECP when the mines' design and environmental plans had not been reviewed or approved by the appropriate government agencies (Sun, 31/1/81).

Despite the criticism, a protocol agreement among the JSI, the coal companies, and the provincial and federal governments was signed in February 1981. All participants noted that considerable work remained as no firm contracts had been signed yet between the coal companies and the JSI (Sun, 11/2/81). The JSI were particularly concerned about the price escalation clause in the sales contracts (Sun, 11/2/81). Throughout early 1981, difficult negotiations between the province and federal governments regarding infrastructure funding continued (Catliff 1985).

In February 1981, the province announced there would be no public hearings on the NECP (Province, 15/2/81), and Phillips refused to release the province's benefit-cost analysis of the mega-project or two other studies on the metallurgical coal market (Sun, 27/3/81). Strong criticism of the project continued. Opposition party MLAs argued the coal volumes to be shipped from the northeast were insufficient to make the infrastructure investment

yield a reasonable return on equity, and argued that the government was displaying unwarranted optimism in the face of contradictory evidence in assuming that volumes would increase in the future (Province, 7/4/81). At a conference on the economic viability of the NECP, held at Simon Fraser University, the majority of participants concluded the NECP was risky and likely uneconomic (Province, 12/4/81). However, a study of the NECP by Price Waterhouse, completed for QCL and BOC, suggested that the critics were wrong. It forecast enormous employment benefits and net financial returns for the province (Price Waterhouse 1981).¹³

By June, 1981 the final contracts between the JSI and the coal companies had not been signed. The port component of the infrastructure was still outstanding, as the contract to build and operate the port had not been awarded. The coal companies said they would have to build their own port facility, and suggested Kitimat as a possible location (Sun, 24/6/81). Despite this outstanding issue, the formal sales contracts were finally signed in July, 1981, and QCL secured a letter of intent from Japanese interests for the purchase of 1 MMTPY of thermal coal (Malkinson and Wakabayashi 1982).

In July, 1981 the province released its regional impact analysis of the NECP, estimating that the operating phase of the mega-project would create 5,000 new jobs in the northeast region, and increase the population by 10,000 individuals. The NECDO established a Regional Impact Consultation Committee to discuss the potential impacts with community leaders and elected representatives in the northeast (BC 1981d). The first construction contracts for the NECP's infrastructure elements were awarded in July, 1981.

In the fall of 1981, the port element of the infrastructure was still not finalized. Negotiations between the coal companies and the company awarded the contract to build

¹³ This study was not a social benefit-cost analysis.

the coal terminal were stalemated. Premier Bennett warned that unless the federal government began the promised work on the Ridley Island site, the province would build its own port on Kaien Island (Globe and Mail, 16/9/81). BC Rail withheld awarding the tunnel contracts on the Anzac spur line because of the lack of agreement on port charges, and warned that if the contracts were not let by November 25/81, the mega-project's critical path would be disrupted. To resolve the deadlock the federal government decided the National Harbours Board would build the terminal, which allowed lower port charges to be offered to the companies (Financial Post, 14/11/81). The agreement on port charges, finally reached in early December 1981, triggered several other activities. The tunnel contracts for the Anzac spur line were awarded (Province, 9/12/81), and the mines sought financing for their projects (Province, 6/12/81).

In the first half of 1982, the JSI was positive regarding the NECP. Australian coal ports were congested with traffic, and the coal market was tight (Catliff 1985). When Esso Resources Ltd. decided to sell its shares in QCL, Japan's Ministry of Industry, Trade and Investment (MITI) said the JSI would increase its involvement in the NECP. The JSI purchased 10% of QCL, and Nissho Iwai purchased a 10% share in BOC. In addition, the Japanese Steel Federation threw its support behind the NECP, enabling QCL to borrow \$950 million, mostly from Japanese banks at a very favourable interest rate (8.5% compared to about 16% in the Canadian financial market) (Catliff 1985). Completion of the financing was delayed as the smaller Japanese steel mills balked at investing in QCL (Sun, 26/11/82). The financing was not completed until January, 1983, and some JSI officials remained unhappy about the NECP going ahead (Sun, 13/1/83).

In July, 1982 the provincial government released its benefit-cost analysis of the NECP (BC 1982a). The analysis suggested the NECP was marginally viable at the prices, costs and volumes assumed. However, the projected net benefits under the base case were relatively

small, and therefore the NECP could easily display a negative net present value should costs increase, or prices or volumes decline. The provincial government's analysts apparently considered the probability of these events to be low, as all the sensitivity analyses except one examined positive variations on the base case assumptions. However, almost immediately the probability of lower prices and/or volumes began to grow. In negotiations in early 1983 with their coal suppliers in South Africa, the USA, China and Australia, the JSI achieved substantial price and volume reductions, and indicated they wanted similar agreements from their Canadian suppliers (Province, 10/3/83). Two southeastern coal mines accepted price cuts of \$14/MT and volume cuts of approximately 30% (Sun, 15/4/83).

The northeastern coal mines moved into their production phase in late 1983 and the first coal was loaded onto a Japanese ship at Ridley Island in January 1984 (Sun, 9/1/84). Criticism of the NECP and the government's involvement in the mega-project continued. A coal mining expert argued that the BC government was subsidizing northeast coal production, and that the government had completely overestimated JSI demand for metallurgical coal despite the JSI's own declining forecasts, making continuing and increasing subsidization a likely outcome (Sun, 21/4/83). Supporting these arguments, a securities firm published its analysis of the coal companies' financial positions that suggested they would lose nearly \$1 billion if prices declined by \$14/MT and volumes by 30% (Carter 1983).

Defending the decision to proceed with the mega-project, Bennett, Phillips and government officials maintained that the northeast contracts were untouchable and would never be cut (Sun, 10/11/83). However, at the official opening of the NECP in June, 1984 the JSI officials admitted that they wanted a price review (Sun, 8/6/84). A shuffle occurred within the JSI; Nemoto was demoted and Teranishi, fresh from the Australian negotiations

where significant price and volume cuts had been achieved, was made the new lead negotiator for the JSI in North America (Catliff 1985).

In October, 1984, BOC agreed to a \$10/MT price cut in return for higher volumes (Globe and Mail, 13/10/84). Rumoured start-up difficulties at QCL's operations were confirmed in January of 1985 when Denison Mines Ltd.'s annual report showed that QCL's production was 22% under target because of the high ash content of the coal (Sun, 10/1/85). QCL was rumoured to be in danger of defaulting on its loan (Sun, 7/2/85). A management shuffle occurred at QCL and Denison in March, 1985, and QCL accepted a price cut to \$91.50/MT (Globe and Mail, 20/3/85). BC's former Chief Geologist reported that he had considered the exploratory drilling on the QCL project to be insufficient, and had warned QCL but more intensive drilling was not completed (Globe and Mail, 9/5/85).

In July, 1985 QCL announced plans to open a new coal pit, subject to obtaining financing, and Denison released its semi-annual report showing QCL had lost \$15.6 million in the first three months of the 1985 fiscal year (Sun, 10/7/85; Globe and Mail, 18/7/85). QCL continued to struggle throughout 1985. While QCL completed construction of its new pit and met contracted production volumes in 1985, Denison Mines Ltd. wrote off its \$240 million investment in QCL in January 1986 (BC Business 4/86).

The first year that the base price in QCL's sales contract with the JSI could be renegotiated was 1987, but the JSI and QCL were unable to agree on a new base price. The deadline for reaching an agreement was continually extended until the JSI requested binding arbitration proceedings in November 1987. Initiation of these proceedings was delayed by the inability of the two parties to agree on a third member for the panel, and in February 1988 the JSI asked the Chief Justice of BC's Supreme Court to appoint a third member. Proceedings began in September 1988, and the arbitration panel released its

decision on May 28, 1990. In that decision, QCL was ordered to reduce its price to about \$85.00/MT in a series of steps between April 1988 and July 1990, resulting in a \$46 million retroactive payment to the JSI (Globe and Mail, 30/5/90). While this price was considerably higher than the competitive market price (about \$62.00/MT), QCL obtained a court order restraining creditors from demanding payment until December 13, 1990 and began reorganizing to cut costs (Globe and Mail, 13/6/90).

The severe difficulties facing QCL threaten the viability of the entire mega-project and its contribution to regional economic development in northeastern BC. QCL is the largest mine, and without its coal production and shipments the infrastructure components of the NECP and the government's involvement in the mega-project would be based on overly optimistic expectations. The social efficiency of the public investment appears questionable, and if the regional development impacts have been less than expected the sacrifice of some social efficiency for regional equity may also not be defensible. This situation raises questions about the NECP's public planning process. We now turn to an examination of that process, beginning with a broad overview of its purpose and objectives, and later turning to a more detailed examination of the regional development objectives and economic evaluation.

3.3 THE PUBLIC PLANNING PROCESS

The purpose of the public planning process was stated in the Subsidiary Agreement as:

... to ensure that any potential development would:

- a) contribute to the realization of national and provincial priorities;
- b) strengthen now and for the future the economy of northeast British Columbia by re-directing and diversifying the economic focus; and

- c) increase the benefits from utilization of the resources of the northeast coal region. (Canada 1977, 3).

The objectives and terms of references for each of the Sub-Committees established under the Subsidiary Agreement during the first year of the planning process are outlined below.¹⁴ Each Sub-Committee drafted its own terms of reference.

The objective of the Coal Resources Sub-Committee was to undertake an evaluation of coal formations in north east British Columbia. The Sub-Committee's efforts focused on identifying a) the quantity and quality of the coal resource, and b) the technological constraints in mining the coal. The terms of reference for this Sub-Committee outlined its responsibilities in the planning process, which were:

- a) technical coordination,
- b) project geology assessment,
- c) resource data analysis,
- d) applied geology investigations,
- e) reclamation studies, and
- f) mineability studies.

The objective of the Transportation Sub-Committee was to analyze the various rail, road and port alternatives available. The key planning issues defined by this Sub-Committee were the cost structures of various transportation options and identification of engineering or technological constraints. The terms of reference required the Sub-Committee to:

- a) analyze three alternative rail access corridors plus spur lines to the mine sites,
- b) analyze operating profiles of these rail access corridors from mine sites to tidewater,
- c) analyze road access alternatives,

¹⁴ The major source for the following discussion is BC (1981b).

- d) complete mapping, surveying, pre-design and geotechnical work for main public access road corridors,
- e) analyze alternative port locations,
- f) develop detailed cost estimates for road alternatives, and
- g) develop detailed cost estimates for port alternatives.

The objective of the Environment and Land Use Sub-Committee was to conduct environmental baseline studies to provide information to assess the environmental impacts of the proposed developments. The lack of information available on the region, plus the extensive nature of the anticipated coal developments, led the Sub-Committee to place its primary emphasis on collecting baseline information. The coal impacts were assessed at a broad, general level, ensuring that important trade-offs were identified for the decision-makers.¹⁵ Specific terms of reference drawn up by the Sub-Committee requested analyses of climate, terrain, soils, vegetation, hydrology, water and air quality, fisheries, wildlife, recreation and aesthetics, and archaeology and heritage resources in the northeast region, plus studies of mine reclamation. In addition, the Sub-Committee was responsible for coordination of the field activities of various study groups and provision of data services to other Sub-Committees.

The objective of the Townsite and Community Development Sub-Committee was to evaluate alternatives for accommodating the increased population in the area that could result from coal development. The primary planning issues identified by the Sub-

¹⁵ Once it became apparent that the most likely infrastructure components would be the Anzac route as the rail access corridor and Tumbler Ridge as the townsite location, the Environment and Land use Sub-Committee focused its efforts on identifying environmental impacts associated with these choices. For example, the Anzac line into the northeast coalfields passed through important winter habitat for ungulates, and the Tumbler Ridge townsite was located within a key ungulate winter habitat area. The broader baseline studies continued until the early 1980s. More specific environmental impact analyses were conducted for each mine within the Mine Development Review process.

Committee were the cost aspects of various options, and the long-term requirements of coal development in the region. The terms of reference required the Sub-Committee to:

- a) analyze the capabilities of existing towns to absorb and service the new population,
- b) analyze the need for a new town,
- c) analyze a new townsite location,
- d) estimate the costs of developing or expanding townsites, and
- e) recommend the financing and administrative policies to be adopted.

The objective of the Manpower Sub-Committee was to comprehensively analyze the supply and demand for manpower for the coal developments with special emphasis on the construction phase and underground mining activity. The primary focus of the Sub-Committee was to ensure that an adequate labour supply for the NECP would be available, but this Sub-Committee aggressively emphasized the achievement of social goals in employment and training policies for the NECP. The terms of reference defined this Sub-Committee's responsibilities as:

- a) investigation of factors contributing to community stability and reduced workforce turnover,
- b) design and development of manpower training and development programs to
 - overcome identified shortfalls of labour supply,
 - improve British Columbia employment opportunities with special emphasis on access to jobs by North East residents, and
 - enhance employment prospects for selected target groups (native peoples, women, the unemployed, and potential school leavers),
- c) analyze the implications of development for migration,
- d) analyze special service requirements, and
- e) analyze the labour situation for competing industrial developments.

Finally, the objectives of the Economic, Financial and Marketing Analysis Sub-Committee were to identify and evaluate development opportunities, to provide overall planning and coordination of the North East study program, and to prepare a synthesis of all material from the other five program components. The terms of reference described this Sub-Committee's responsibilities as:

- a) evaluation of opportunities related to coal processing and servicing,
- b) evaluation of opportunities in other sectors,
- c) assessment of the extent to which these opportunities can be realized within the region,
- d) assessment of the capital, labour and other input requirements necessary to fully realize the identified opportunities,
- e) provision of management consulting,
- f) provision of market analyses,
- g) provision of critical path analysis for both the study and development phases,
- h) provision of financial and economic analyses of specific program areas (townsite, transportation), and
- i) provision of financial and economic analyses of the overall North East coal development to determine the overall economic benefits to British Columbia and Canada.

The Sub-Committees' objectives and terms of reference suggest that the primary foci of the 1976-77 planning studies were the costs of various infrastructure options, and the potential constraints that could affect the mega-project. Capital and operating costs were the central considerations under the cost focus, but some components of the environmental costs of various infrastructure options were also identified. Technological issues regarding mining or infrastructure construction were prominent concerns, as were the potential

constraints of an insufficient supply of skilled labour and insufficient market demand for the coal.¹⁶

Despite these significant constraints on the viability of the NECP, the planning task force argued that the preliminary analysis supported a number of recommendations regarding the most efficient siting or routes for the major elements of the proposed infrastructure, which were:

- a) a new branchline from Anzac on the BCR mainline through tunnels at the headwaters of the Hominka river and down the Wolverine River to the area of Tumbler Ridge to service the mines in the central area of the coalfields,
- a) upgrading the BCR mainline from Anzac to Prince George and the CNR rail line from Prince George to Prince Rupert, and construction of a new port at Ridley Island for the remaining rail route and port infrastructure,
- b) a townsite at Tumbler Ridge to service development of the central area of the coalfields, and
- c) a new highway from Chetwynd to Tumbler Ridge plus continuing upgrading and realignment of the Heritage Highway for the road access system (Malkinson and Sivertson 1978).

Each of these recommendations was based on the assumption that more investment in coal mines would occur in the northeast region, particularly in the southern part of the coalfields.

The final component of the first phase in the public planning process was a preliminary economic assessment of the NECP. A preliminary benefit-cost analysis suggested the mega-project was economically viable. The only case where a negative net present value was generated in the analysis was if QCL was the only mining property to proceed, and

¹⁶ The Cabinet Committee on Coal released a series of reports in 1977 that summarized the findings of the sub-Committees; a list of these reports is provided in Appendix 3B.

prices remained at approximately \$58.25/MT (1976\$C) (Malkinson and Sivertson 1978). In 1976, Balmer Mine in southeastern BC received \$54.64/MT FOB. The preliminary benefit-cost analysis implicitly assumed that a) the price increases observed in the early 1970s would be sustained, and b) the JSI would be willing to pay a price premium for coal from northeastern BC compared to southeastern BC.

Thus, at the end of the first phase of analysis and evaluation, the planning task force had identified the major constraints on the NECP's viability. If the market stayed approximately where it was, the financial aspects appeared sound. Technological issues related to infrastructure apparently were resolvable as the task force concluded certain options were preferable to others. The infrastructure choices also identified the physical shape of the mega-project, giving it a tangible quality. The major outstanding issues were concerned with underground mining, and involved both the successful application of techniques and the supply of skilled manpower. In addition, questions about the market remained.

The Subsidiary Agreement was extended in March 1977 for another year, and a joint commitment of \$10 million was made by BC and Canada, with BC committing a further \$2 million on its own. In this second phase, the critical issues of underground mining and potential markets were investigated further, but importantly, several of the committees began work on detailed design and engineering studies for the major infrastructure projects (Malkinson and Wakabayashi 1982). The design and engineering work was required to support QCL's Fall 1977 construction target. Several of the Sub-Committees' terms of references were altered to reflect this shift. The Transportation Sub-Committee was charged with:

- a) further survey, engineering and geotechnical analyses of road and rail access routes from existing highways and rail lines,

- b) highway planning and construction work, and
- c) port development planning.

The Townsite and Community Development Sub-Committee was asked to:

- a) prepare a conceptual design and engineering plan for the Tumbler Ridge townsite,
- b) prepare a conceptual engineering design for townsite central sewerage and water supply facilities,
- c) analyze the impact of the proposed northeast coal developments on the communities of Chetwynd and Dawson Creek,
- d) analyze cost-revenue and cost-sharing options for townsite development,
- e) determine the appropriate organizational management structure for undertaking the new townsite development,
- f) undertake townsite area base mapping and survey control, and
- g) analyze the provision and cost of telecommunications services.

The other Sub-Committees continued with work programs under their existing terms of references.

Markets for metallurgical coal softened in the latter part of 1977, and QCL postponed its decision on a construction start up date. Reflecting these changing circumstances, the Sub-Committees' work programs were continually monitored and many studies were delayed. Actual public planning expenditures for the fiscal year 1977-78 were significantly less than anticipated, totalling approximately \$4 million (Malkinson and Sivertson 1978).

In March 1978, the Subsidiary Agreement was extended for two years to permit completion of the planned studies in a time frame more consistent with market circumstances. However, the continuing interest and optimism of the provincial government was expressed by Malkinson and Sivertson in a paper delivered to the annual conference of the Canadian Institute of Mining in 1978.

The planning work and feasibility studies undertaken by governments and coal companies over the past and at present will put these projects in a state of preparation for the future. This will permit fast decisions to be taken so that future market opportunities can be captured when markets recover. (Malkinson and Sivertson 1978, n.p.).

By December 1979, only a few studies remained outstanding, such as the final consolidation of all the completed planning work into an overall economic evaluation of the project. In addition, during the 1978-1980 period, one of the critical issues identified in the planning process, the difficulties of underground mining, was resolved. QCL abandoned its underground mining plans and changed to a complete surface mining operation, and the Sukunka project was replaced by the Bullmoose project, which was also a surface mining operation. Thus, only the market issue remained, and in early 1980, the metallurgical and thermal coal markets began to strengthen. Planning for the NECP intensified. The Subsidiary Agreement was extended for another year until March 1981 to allow completion of outstanding studies and to initiate other studies required to support a construction start up date of the fall of 1981.

The official budget allocated to the public planning process over this time period (1976-1981) was \$13 million, of which \$1,041,726 remained outstanding by March 31, 1981 (BC 1981b, 13-14).¹⁷ At that time, 53.5% of the total budget had been spent on transportation studies, 16.6% on environment and land use studies, 7.0% on market studies, 6.1% on studies of the coal resource, and 6.1% on community development studies (Table 3.1). Don Phillips tabled 100 of these studies in the BC Legislature in the summer of 1981.

¹⁷ To complete any remaining studies and use up the remaining budget, the Subsidiary Agreement was extended until March 31, 1982.

¹⁸ A list of these reports is provided in Appendix 3C.

TABLE 3.1
NECP PUBLIC PLANNING BUDGET BY EXPENDITURE CATEGORY
AS OF MARCH 31, 1981

Expenditure Category	\$ Spent	% of Budget
Coal Resource	\$798,788	6.1
Transportation	6,954,769	53.5
Environment & Land Use	2,160,389	16.6
Community Development	796,388	6.1
Manpower	256,087	2.0
Economics & Market	911,853	7.0
Public Information	80,000	0.6
TOTAL	11,958,274	92.0
Outstanding	1,041,726	8.0

Source: BC 1981b, 14.

In anticipation of a sales agreement between the JSI and the two coal mining companies, the provincial Ministry of Industry and Small Business Development hired, in the fall of 1980, a consulting firm to analyze and make recommendations on a number of project management issues (Malkinson and Wakabayashi 1982). The consulting firm was asked to:

- a) prepare a comprehensive project schedule,
- b) prepare a detailed breakdown of tasks to be accomplished within the schedule, including key milestones that would ensure i) that the project would be completed on time and on budget, and ii) that the Province's economic, social and environmental objectives would be met,
- c) prepare reports on key constraints to the achievement of the project schedule, and
- d) identify and evaluate alternative organizational structures for project management.

With respect to the latter requirement, the consulting firm considered four possibilities: continuing with key government staff that had been involved with the planning phase,

forming a special project group within a provincial Ministry or existing agency, forming a Crown Corporation, or forming a special project group reporting directly to Cabinet but not within an existing Ministry or agency (Malkinson and Wakabayashi 1982).

Drawing on the consultant's recommendations, Cabinet created the North East Coal Development Office (NECDO) in January 1981 as a special project group reporting directly to the Cabinet Committee on Coal Development (Figure 3.6).¹⁹ On February 23, 1981 Ron Basford was appointed as the Director of the NECDO, and was given three tasks:

- a) to conduct negotiations on all final agreements between the Province, the mining companies, and other public and private agencies playing a role in the North East coal development;
- b) to provide specific liaison between those involved in the development and the responsible provincial ministries by reporting to the inter-ministerial Deputy Ministers Committee; and,
- c) to coordinate information and provide general liaison among the various levels of government and other groups and agencies involved in the coal development project. (Malkinson and Wakabayashi 1982, 49).

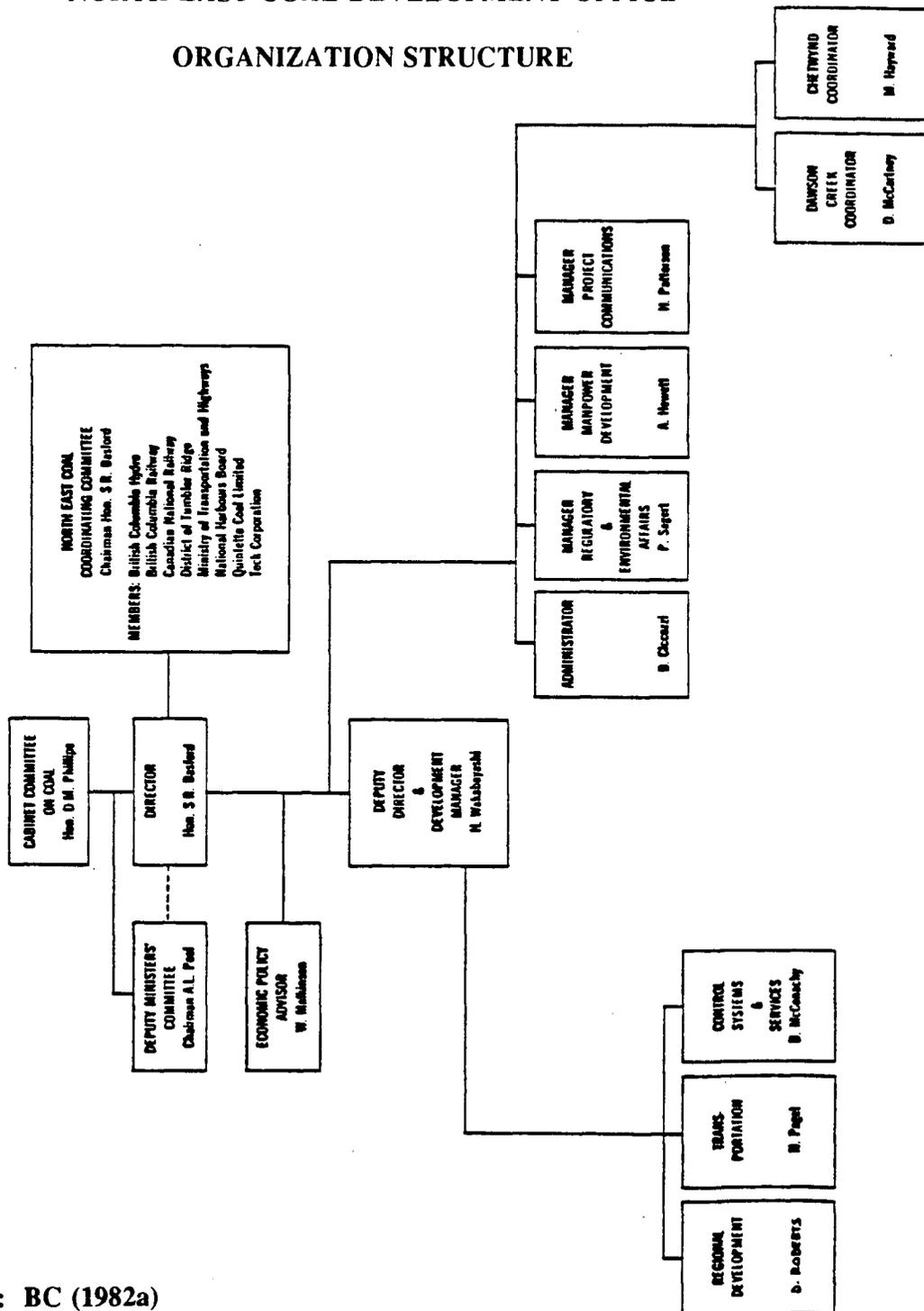
NECDO was a small agency with eight professional staff located in Vancouver and two liaison personnel in the northeast region. The professional staff covered the areas of project engineering and control, regulatory and environmental affairs, manpower development, project communications, and accounting and office administration.

To accomplish its mandate, NECDO coordinated and participated in a number of committees, including the North East Coal Coordinating Committee, the Project Managers' Committee, the Project Communications Committee, and the Regional Impact Consultation

¹⁹ Of the four organizational alternatives considered, this institutional arrangement provided the maximum flexibility and independence at the lowest cost; in addition, it was easy to create and dissolve, and would not duplicate existing organizations' responsibilities.

FIGURE 3.6

NORTH EAST COAL DEVELOPMENT OFFICE
ORGANIZATION STRUCTURE



Source: BC (1982a)

Committee.²⁰ The members of the North East Coal Coordinating Committee were senior executives from the participating organizations; each executive was responsible for his or her organizations' NECP activities. The Committee met monthly to report on the progress of individual projects and to discuss issues that could affect the NECP's critical path. The Committee also discussed issues that arose in other areas such as manpower development, regulatory or environmental affairs, procurement, social impact and project communications (Malkinson and Wakabayashi 1982). The Project Managers' Committee met monthly immediately prior to the Coordinating Committee to discuss detailed project management issues with respect to achievement of the project schedule. The Regional Impact Consultation Committee was established to monitor social impacts and coordinate impact management responses of provincial ministries. Other *ad hoc* committees met on such issues as environment, manpower, and procurement on a request basis; generally these were meetings between relevant experts, which NECDO coordinated (Malkinson and Wakabayashi 1982).

Malkinson and Wakabayashi (1982), key members of the NECDO staff, reported that the North East Coal Coordinating Committee and the Project Managers' Committee were the most important committees. Only these committees met monthly, and their primary objective was to ensure that the project schedule was achieved and that other provincial objectives were addressed. It was through these two committees, combined with monthly reports on general project status and detailed project costs, that the Province maintained project coordination and control.²¹

²⁰ These Committees were created by the inter-ministerial Deputy Ministers Committee that reported to the Cabinet Committee on Coal. The Comprehensive Agreements between the Province and the coal companies state that the coal producers shall cooperate with the Director of NECDO and all other participants in the NECP, although it does not specifically state that they shall participate in the Committees.

²¹ The monthly project cost reports were required only from the provincial agencies participating in the NECP; the private sector companies only submitted monthly status reports.

NECDO was also given the responsibility of negotiating the legal agreements to "... attempt to ensure that the timing, budget, financial, and overall objectives for the project would be achieved." (Malkinson and Wakabayashi 1982, 52). Of the numerous (more than twenty) legal agreements among the participants, the NECDO office participated in or coordinated the negotiations of five agreements, with direct responsibility for the two Comprehensive Agreements between the Province and the mining companies. In addition, NECDO was called upon to act as a catalyst in negotiations of about ten other legal agreements.

Generally, the legal agreements associated with the NECP set out the rights and duties of the parties, the various expenditures to be made, cost recovery techniques to be employed, and remedies of the parties. For example, the Comprehensive Agreements negotiated between the Province and the two mining companies included such items as provincial services and infrastructure, cost recovery terms, and the coal companies' mining activities and commitments to the province (Malkinson and Wakabayashi 1982). They also included dispute resolution procedures, default remedies, and communication procedures (BC 1981e; BC 1982b).

The Comprehensive Agreements emphasized project management considerations. In the Article dealing with cooperation, coordination and timing, the parties were committed to keeping to the mega-project's critical path and notifying other participants of deviations. Other articles related to achievement of other provincial objectives were not as specific. For example, regarding local hiring, the mines were committed to work with the Province, and the Government of Canada to develop manpower plans. Compared to the critical path-related articles, this article was indicative. Similarly, the article dealing with regional procurement was indicative, referring to the provincial policy on procurement but setting

no targets. The articles related to the achievement of the province's broader goals did not specify any targets or milestones as the critical path articles and schedules did.

This review suggests the planning process was primarily concerned with ensuring a) that the NECP was viable, technically and financially, and b) that the mega-project was built on schedule and on budget, particularly with respect to the government's infrastructure components. In the early phase the planning process focused on costs and constraints, and despite a number of significant constraints, considerable planning resources were assigned to design and engineering considerations in the next phase. The last phase of the planning process focused on project management. Compared to the stated purpose of the planning process, outlined at the beginning of this section, the actual planning foci appear to be narrow and biased towards the costs of the infrastructure components of the mega-project. Other important aspects of the mega-project relating to its regional economic development impacts, and its long-term economic viability, may have been pushed aside or screened by the concerns over infrastructure costs. This suggested trend is investigated in more detail below with respect to the formation of regional development objectives and programs for the NECP, and in the economic evaluation of the mega-project.

Regional Development Objectives

The purpose of the public planning process included ensuring that the coal developments would strengthen the economy of northeast BC by re-directing and diversifying the economic focus, and increasing the benefits from utilization of the coal resources. Early in the planning process, increasing the benefits by encouraging downstream linkages in coke and steel manufacturing was judged to be infeasible (Halvorson 1976). Thus, maximizing the benefits from the NECP consisted of maximizing backward, final demand and fiscal

linkages. Maximizing these benefits within the northeast region depended on maximizing regional employment and procurement by the coal companies.

The primary responsibility for maximizing direct regional employment was adopted by the Manpower Subcommittee during the analysis and evaluation phase of the public planning process (1976-1980).²² This Sub-Committee argued the Province should focus on maximizing employment opportunities for northeast residents, particularly certain target groups, and the Sub-Committee's recommendations emphasized the great need for training programs and a development agreement with the mining companies as the following quote from the preliminary report shows.

The development of appropriate and coordinated training initiatives by government and coal mine developers should be undertaken within the framework of a development agreement, without such a mechanism orderly training of regional residents and their consequent access to mine employment will be impaired. (BC 1976b, 251).

The background studies completed for the Manpower Sub-Committee identified a significant pool of labour in the northeast that was interested in coal mining employment (Cornerstone 1977), and the barriers facing regional residents and members of certain target groups who were interested obtaining coal mining employment (Veit 1976; van Dyke 1976). Additionally, the Manpower Sub-Committee's analysis suggested there was a large supply of excess labour in the northeast (BC 1976b). Given that approximately 80% of the hourly workers at an open pit coal mining operation did not have to be highly qualified from the start of operations, the Sub-Committee argued that a large portion of the operating phase labour demand could be met from within the labour force of the northeast region, given adequate training programs were instituted in advance and certain other requirements, such as adequate daycare facilities, were provided.

²² It is very interesting that there was not a Regional Development Sub-Committee within the planning task force.

Consequently, the Manpower Sub-Committee's preliminary report made the following ten recommendations that focused on maximizing employment benefits for residents of the northeastern region.

It is recommended that the Province adopt the following social goals for any North East coal development:

- a) Improve the employment opportunities of all British Columbia residents, with special emphasis on achieving significant employment advances for those living in the North East.
- b) Ensure enhanced employment prospects for selected target groups; specifically women, Native Indians, the unemployed, potential school leavers and any other population sub-group which may be designated.
- c) Foster maximum community stability.
- d) Reduce work force turnover to a minimum.

It is recommended that training programs necessary to fulfill development needs be mounted within the North East Region wherever costs and time permit this to be done.

It is recommended that the Province negotiate an agreement with each North East coal mine developer, at the earliest possible stage in the planning process, covering the following items, among others:

- a) concurrence with social goals for coal developments adopted by the Province;
- b) declaration of mine manpower needs by position by sufficient qualifications;
- c) coordinated efforts, including training, to assure achievement of agreed goals;
- d) assurance that employment will be available and offered to qualified persons in the agreed numbers for each skill level;
- e) commitments to solicit and hire qualified personnel resident in the North East as a first priority;
- f) cost-sharing for manpower programs, including provision for penalties upon non-fulfillment of agreement in whole or in part;
- g) declaration that firm is an equal opportunity employer and, for example, will provide amenities to enable the full participation of women in all employment.

In any agreement the Province should specify its commitment to provide agreed amounts of training and complementary services in support of corporate manpower commitments.

It is recommended that public training efforts be designed with reference to the needs of specific projects according to

negotiated agreements between the Province and each coal mine developer.

It is recommended that the Province adopt specific goals with respect to the numbers of persons to be prepared for coal mine employment from each designated North East population group. Such goals are necessary to determine the allocation of resources among manpower programs and to estimate the costs of such programs.

It is recommended that public programs (along with physical facilities where applicable) be implemented or expanded where they are deemed necessary complements for increasing the mining employment opportunities available to all regional residents.²³

It is recommended that the Province coordinate with the Federal Government in developing manpower policies in the areas of adult training, on-the-job training, immigration of trained personnel and increased participation of groups who traditionally experience little involvement in economic developments.

It is recommended that the government make public its goals and policies with respect to manpower issues in any North East coal development. A public statement should describe the roles and responsibilities of both the public and private sectors.

It is recommended that further research on manpower issues be undertaken in areas which may have a direct bearing on manpower policy for North East coal developments.

It is recommended that the government, as part of all training and associated initiatives undertaken with respect to North East developments, make specific provision for the needs of persons in the region seeking employment in economic sectors other than coal mining. (BC 1976b, 2-12).

In the second phase of the Subsidiary Agreement, five studies were commissioned by the Manpower Sub-Committee. They were: Construction Phase Manpower Study, Manpower Studies for Surface and Underground Mining, Community Centered Workforce Turnover

²³ Included in this recommendation, but not quoted here, were specific recommendations for target groups within the region.

Study, Manpower Development and Promotion, and Documentation of Manpower Training Programs. Reports from four of these studies were reviewed.²⁴

The Construction Phase Manpower study (BC Research 1978) concluded no actions on the part of government would be required to ensure that an adequate supply of labour would be available for the construction phase. The Manpower Development and Promotion study (Peat Marwick 1978) concluded that manpower training and development was inadequate in the Canadian coal mining industry and recommended a joint government-industry forum be established for the North East coal development to design and implement manpower strategies. For these joint efforts to succeed, the report argued the government and industry would be required to clearly enunciate their goals and set common objectives. The report also emphasized that the government would have to initiate specific actions to help individuals from regional target groups obtain employment. The Labour Turnover and Community Stability study (Veit 1978) concluded that employing local people would reduce turnover and increase stability, and argued that special programs were required to ensure women and natives obtained employment in the coal mining industry. This study recommended a Development Agreement between the government and the coal companies as the most appropriate mechanism for ensuring that practical solutions would be systematically implemented. The documentation of Manpower Training Programs (BC 1978) listed the training programs currently available in BC relevant to coal mining, described the existing mechanisms for delivering post-secondary training, and provided some estimates of training costs. This study provided the background required to design training programs specific to the NECP.

The studies completed in the second phase of the Subsidiary Agreement for the Manpower Sub-Committee supported the earlier recommendation; to maximize employment

²⁴ The other report, Manpower Studies for Underground and Surface Mining, could not be located.

opportunities for regional residents, training programs and comprehensive development agreements were required. However, in 1981 a summary planning document reported that actual development of manpower training programs to remedy the potential skill mismatch in the northeast region was "ongoing"; that the "development of training 'modules' (was) progressing well", and that "Investigations of means to encourage participation of disadvantaged groups (were) ongoing and recommendations ... continue(d) to be developed." (BC 1981b, 34). Specific targets were not included in the Comprehensive Agreements negotiated with the coal companies, and there is no documentation that suggests specific training programs were designed and implemented.²⁵

As the planning process shifted into the implementation phase, the responsibility for maximizing regional employment lay with the NECDO, particularly the North East Coal Coordinating Committee and the Regional Impact Consultation Committee. As discussed in the previous section, the former committee's primary responsibility was project management. The Regional Impact Consultation Committee was created in response to the province's regional impact analysis,²⁶ which projected that the total population impact of the NECP on the region in 1987 would be an increase of approximately 10,000 individuals (about 20% of the regional population). In discussions between the communities in the northeast region and the Regional Impact Consultation Committee, nine specific issues related to regional impacts were identified (BC 1981d). Concerns were expressed about community stability, crime rates, employment prospects for regional residents, municipal financial resources, housing, physical infrastructure, recreational and

²⁵ Personnel managers at both mines, interviewed in October 1989, said that the mines received no assistance from the provincial or federal governments in designing or implementing training or recruitment programs.

²⁶ While the application of the Coal Development Guidelines were the normal process through which the socio-economic impacts of a mine development would be identified and planned for, the Province noted that the individual submissions under the guidelines would not address the cumulative impacts of the entire NECP on the northeast region. Thus the Ministry of Industry and Small Business Development completed the analysis, and the Regional Impact Consultation Committee of NECDO coordinated the discussion of the impact analysis with regional residents, provincial agencies and the coal companies.

cultural facilities, staffing requirements of government agencies and the influx of transients into the region. In addition, the communities complained about the lack of information from the mining companies and the government regarding the NECP. In these discussions numerous community representatives emphasized the need for regionally-provided training programs, with specially designed programs for Natives (BC 1981d). Despite this, the Regional Impact Consultation Committee adopted a distinct impact mitigation stance in its recommendations and final report, focusing on mitigating the short-term disruptions likely to result from the NECP, rather than enhancing the longer-term potential benefits by maximizing employment opportunities for regional residents.

By this stage of the planning process, the expectations regarding regional employment opportunities apparently had changed significantly. The Manpower Sub-Committee's arguments that most of the direct mining jobs could be filled by regional residents had been replaced by much lower expectations. Of the 2000 new direct jobs projected for the region by 1987 from the operating phase of the mega-project, the impact analysis assumed that between 10% and 20% of the direct mining jobs would be filled by regional residents, arguing that

The 10% figure alone represents a significant attraction of regional workers while the higher estimate would require successful programs to hire traditionally underrepresented groups such as Natives, women, high school leavers etc. (BC 1981c, 37).

This suggests that the provincial government was expecting that 200 to 400 of the 2000 direct coal mining jobs would be obtained by regional residents, and that the province considered this to be reasonable given its assessment of the key factors affecting coal mine operating employment, which the regional impact analysis listed as:

- a) relevant work experience (or training) is a valuable asset if not a necessity for many of the skilled jobs.
- b) unions will be seeking certification of the mines.

c) the mining companies are committed to hiring locally and regionally to the maximum extent possible and to minimizing the proportion of experienced miners required.

d) the interest among residents qualified for mine training programs may not be a constraining factor, but the availability and willingness to move among qualified persons may be a constraint. (BC 1981c, 36).

The Regional Impact Consultation Committee's primary focus was social impact mitigation. Thus the need for training programs, and the inclusion of targets and specific details in the Comprehensive Agreements between the province and the coal companies, recommended so strongly by the Manpower Sub-Committee, were apparently given inadequate attention during implementation.

Maximizing local employment opportunities is clearly not the only component of regional development, nor did the Province interpret it this narrowly.

The impact of coal development on the region will be immense. North East British Columbia coal development will not only result in the creation of major employment opportunities in the immediate vicinity of the coal mines and at strategic points on the transportation network, but could also have a positive impact upon other sectors of the regional economy. Ancillary industries to assist in the service, supply and maintenance of coal mining operations will identify an opportunity to become established in the area and will add considerable strength and diversification to the local economic base. (BC 1981b, 6).

The Economic, Finance and Marketing Analysis Sub-Committee was responsible for investigating the regional opportunities in coal processing, servicing and other sectors, including identifying the opportunities and potential constraints. However, bibliographies of the reports prepared for the Sub-Committee do not include any studies related to these issues. In the implementation phase, the North East Coal Coordinating Committee was responsible for ensuring that regional procurement occurred. However, the primary focus

of this committee was project management, and the articles in the Comprehensive Agreements dealing with procurement simply referred to the province's procurement policy. The Procurement Policy, established in the early 1980s, urged all project developers, including those involved in the NECP, to use BC suppliers and expertise. The Procurement Policy suggested that procurement plans and goals would become part of BC's project evaluation processes, and that procurement monitoring would be conducted. In addition, the Province produced a set of pamphlets and documents advertising business opportunities associated with coal development, and bidding processes and procedures for major projects. However, this was the extent of the government's attempts to ensure that regional procurement was maximized.

The degree to which the regional development objectives of the NECP were achieved will be analyzed in following chapters, but first we examine in more detail aspects of the planning process concerned with the economic viability of the mega-project.

Economic Evaluation

The economic evaluation of the NECP was the responsibility of the Economic, Finance, and Marketing Sub-Committee. This Sub-Committee did not release a preliminary report in 1977 outlining its findings and recommendations like the other Sub-Committees did. Nevertheless, a number of early studies were done that indicated a very positive outlook for metallurgical coal. The provincial Task Force on Coal (BC 1976a) suggested that the JSI's steel-making capacity would continue to grow until it stabilized at 190 MMT in 1990. The resulting demand for metallurgical coal would be 112 MMT in that year, an enormous increase of nearly 100% over demand in the early 1970s. The Task Force concluded that, combined with the large increases forecast for the global steel market, BC coal would find a ready market. A study completed by Rio Tinto North American Services Ltd. (RTNAS)

for the Sub-Committee during the first year of the planning process forecast an incredible increase in global metallurgical coal exports, increasing from 97 MMT in 1975 to 256 MMT by 1995, and at the same time forecast rising real prices, reaching \$51.27 - \$56.20/MT FOB (1976\$C) (RTNAS 1976).

Other studies prepared for or consulted by the Sub-Committee during the first year of the planning process contained more pessimistic forecasts. Sivertson and Clancy (1976) argued strongly that the high coking coal prices observed in 1975 were far above the long-run equilibrium level, and thus should be expected to fall considerably. The authors recommended that no mines should go ahead unless they could survive at prices of \$27.18/MT FOB (1976\$C). Echoing that study's pessimism, Sivertson (1977) argued that the fundamental dynamics of the metallurgical coal market and BC's competitive position indicated that there would be little opportunity for expansion of coal supply in BC before 1990. Sivertson argued that if new projects were encouraged, there would be an oversupply situation in the 1980s and downward pressure on prices.

Based on these studies and their own analyses, the Economic, Finance and Marketing Analysis Sub-Committee prepared a preliminary benefit-cost analysis of the NECP.²⁷ This analysis suggested the NECP was financially feasible at coal prices in the range of \$60.00 to \$64.00/MT FOB (1976\$C) and export volumes of 7 to 8 MMTPY. The only case where the NECP's net benefits were negative was if QCL was the only mine property to be developed, and prices stabilized at \$58.25/MT FOB (1976\$C) (Malkinson and Sivertson 1978).

²⁷ In 1978, this benefit-cost analysis was presented to the annual CIM meeting (Malkinson and Sivertson 1978). The analysis presented was closer to a financial appraisal of the mega-project than a benefit-cost analysis as it excluded consideration of shadow prices or externalities and focused on financial expenditures and receipts by the various parties in the mega-project.

Despite this mostly positive preliminary analysis, the importance of future prices and markets to the NECP's viability was recognized. Malkinson and Wakabayashi (1982) said that a key constraint identified in the first phase of the planning process was future market conditions, and this issue continued to receive considerable attention during the next phase of planning while other Sub-Committees began design and engineering work. A number of additional studies were prepared for or consulted by the Sub-Committee, and most forecasted declining metallurgical coal imports by the JSI, and emphasized the rising importance of cost competitiveness in determining market share. Stanford Research Institute (SRI) (1978) completed a world survey of metallurgical coal demand and supply that noted the steady decline in steel production and consumption in Japan after 1973 and forecasted that this would continue, resulting in lower growth in demand for metallurgical coal imports in that country. Importantly, the lower growth rate in steel demand and production was attributed to structural changes in the global and Japanese markets that were not expected to reverse.²⁸

Other studies prepared for the Sub-Committee also suggested the strong demand growth would not continue. RTNAS (1978) argued that coke making trends suggested the JSI would have a lower demand for higher quality metallurgical coal in the future. Jones and Sivertson (1979) noted the same structural forces as SRI (1978), and forecast much lower JSI production levels, and consequently much lower metallurgical coal imports. Given the JSI's current and contracted metallurgical coal imports in 1979, Jones and Sivertson concluded that no new metallurgical coal production would be required until the late 1980's. According to Jones and Sivertson, new metallurgical coal supply would only be required if JSI production grew quite dramatically, and even then only 6 MMTPY of new

²⁸ The rising value of the yen, rising non-tariff barriers for Japanese exports, rising steel production capacity in the newly-industrializing countries, environmental and land use constraints in Japan, and the decline of the Japanese ship-building industry were all identified as contributing to the lower growth rates of Japanese steel production in the future.

supply was indicated. Jones and Sivertson argued the JSI would prefer low cost supplies and smaller projects to meet this potential demand, not the inevitably higher costs of a mega-project like the NECP.

However, metallurgical coal prices increased again in the early 1980s. The JSI expressed renewed interest in the NECP, and an agreement-in-principle with the coal companies and the Canadian governments was reached. At this point, the provincial government and the Economic, Finance and Marketing Analysis Sub-Committee were concerned over the stability of future markets. However, they apparently did not want, or did not have the power, to stop the NECP. Sandy Peel, the Assistant Deputy Minister of BC's Ministry of Economic Development, reflecting on this critical period in the NECP's history, said

... in 1981, when the Japanese came back and said they could accept the increased tonnage, the deal looked good enough to go ahead with an entirely new transportation system in the North. Besides, the mining companies and the federal government were already committed. "When other people are spending in the order of \$1.8 billion, you don't walk away and say, 'Well, gee, we're worried about the markets'", Peel (Assistant Deputy Minister, Industry and Small Business Development) says. (Canadian Business September 1984).

Don Phillips, Chair of the Cabinet Committee on Coal, when questioned in 1986 on the crumbling metallurgical coal market conditions, said

The entire banking system of the world is involved. Those goddamn banks didn't put up a billion dollars on the say so of the Government of BC unless it was a good deal. They checked it exhaustively. If we are dumb, they are dumb. (Phillips, quoted in BC Business April 1986, 18).

The Economic, Finance and Marketing Analysis Sub-Committee was required to assemble and merge all of the planning analysis into a comprehensive evaluation of the NECP. This benefit-cost analysis was released to the public in July 1982, after construction had already commenced on the NECP. the study concluded that the NECP would create net benefits for Canadians and thus was a justifiable use of public funds (BC 1982a). Briefly,

it assumed that the real price increases that occurred during the 1970s would be sustained, contrary to the historical trends in metallurgical coal prices where dramatic peaks were always followed by sustained periods of depressed prices (Sivertson and Clancy 1976). The extent to which the economic evaluation of the mega-project was reasonable given information available at the time will be assessed in a later chapter.

3.4 SUMMARY

Successive provincial governments have pursued rapid economic growth through exploitation of BC's natural resources. Large-scale projects, with province-building overtones, have not been uncommon. In the 1970s, the leading sectors in the provincial economy, forestry and metal mining, were reaching maturity. Coal apparently offered new and tantalizing opportunities for rapid economic growth and regional economic development. The Province's experience with metallurgical coal mining had all been gained in the late 1960s and early 1970s, and most of it had been very positive. Very southeastern BC. The huge increases in prices during the mid-1970s raised expectations around the coal industry and the provincial government undertook numerous initiatives to organize the institutional framework for coal development planning so that BC would receive the maximum benefits at the minimum cost.

The NECP promised to open a second coal supply source in the Province and thus improve the province's position to capture a large proportion of the rapidly increasing demand and prices. In addition, the NECP apparently would diversify and develop the northeast region's economy. The mega-project was portrayed as a key element in BC's long term economic development strategy. A unique planning process was designed to address the viability of the NECP, and to ensure that it would contribute to regional economic

development in northeastern BC and the province. A federal-provincial task force was created in 1976, with a number of Sub-Committees which examined a range of issues related to the mega-project. The federal and provincial governments cooperated in funding this process, and seconded civil servants to the various Sub-Committees. The Sub-Committees made wide use of consultants in analyzing the planning issues, and the planning process was apparently well-funded.

During the first phase of the public planning process, the Sub-Committees' terms of reference emphasized identifying the costs and constraints facing the NECP, especially the capital and operating costs associated with the major infrastructure components. The initial analysis suggested the only constraints were the supply of skilled underground miners, the application of underground mining technology, and the continuation of a strong market for metallurgical coal. Given these constraints, the most efficient infrastructure pattern was identified and recommended. A preliminary benefit-cost analysis of the NECP suggested it was a financially viable initiative, providing further support for the infrastructure recommendations. The JSI's phenomenal growth was projected to continue, creating a huge demand for metallurgical coal. However, some experts recommended caution and during the next phase additional market analyses were conducted.

During the second phase, substantial planning resources were allocated to design and engineering work on the major infrastructure components to support the QCL target of fall 1977 for construction start-up. However, markets slumped and the planning work was re-programmed. The time frame for completing the scheduled planning studies was extended for two years until 1979. Importantly, during this slower period in the planning process a key constraint facing the NECP, the feasibility of underground mining, was removed by the coal companies' decisions to change to all surface mining operations. This left the markets as the only major outstanding issue. The key political advocates, the Premier and

the Chair of the Cabinet Committee on Coal and thus of the NECP planning process, attempted to reduce the market uncertainty during this phase of the planning process. They visited a number of Pacific Rim countries and attempted to secure new markets for BC coal. They visited Japan in an attempt to secure contracts for coal from northeastern BC. And, the provincial government created a Coal Coordinator's Office to monitor old and pursue new markets. These activities, and the apparent commitment and momentum that supported them, may have been very important in maintaining momentum around the NECP.

During this slow period, the planning task force continued to monitor the market but the signals remained poor. No other opportunities for exports arose despite efforts by the provincial government to open new markets. Then, markets suddenly improved in 1980 and the JSI expressed renewed interest in the NECP. This marked the beginning of a conflict-ridden period of nine months of uncertainty as all parties attempted to negotiate the numerous, complex agreements required. Turbulent market conditions during this time increased the uncertainty. In addition, substantial criticism of the mega-project emerged as the NECP left the confines of the government bureaucracy and entered the limelight of public attention.

Agreements among the various parties began to be reached and by the fall of 1980, the provincial government was apparently confident enough to begin thinking of an appropriate implementation strategy. When agreements-in-principle were reached between the various participants in January 1981, the province created the NECDO to coordinate the NECP's construction. The major focus of the NECDO apparently was project management, with some concern for social impact mitigation. Programs and other initiatives to maximize regional employment and procurement, strongly emphasized during earlier phases of the planning process, may have been overwhelmed by the massive

requirements of ensuring the mega-project came in on schedule and on budget. The complexity and challenges of the mega-project were enormous. It involved construction of Canada's largest open pit coal mine, an electrified railway with the longest electrified tunnel in North America, and a new resource town when the province's policy was not to allow any new single industry resource towns.

Criticism of the mega-project continued, attacking both the expected regional development benefits and the economic viability of the mega-project. The planning task force, which may have had lingering doubts regarding the economic viability of the NECP, was apparently unwilling or unable to stop or delay the mega-project. The only other potential brake on the well-established momentum would have been a public hearing, and the provincial government ruled out this option in early 1981.

As the criticism continued, so did the fractious negotiations among the various participants. Uncertainty over future market conditions and the distribution of revenues apparently led to much of the conflict. However, final sales contracts were signed in July 1981 and the first construction contracts for the infrastructure were let. Despite continuing conflict and uncertainty, the mega-project was finished on time. The first coal shipments from the mines were made in late 1983.

However, before the mines moved into their production phase, the metallurgical coal market began to crumble. Pressure for price reductions were exacerbated by start-up difficulties at QCL. These difficulties were so severe that additional capital investment in a new pit was required in 1985, and Denison Mines Ltd. wrote off its equity investment in January 1986. Market conditions continued to worsen and QCL is currently in severe difficulties as it struggles to cut costs to meet an arbitration panel's price decision.

The current difficulties of the NECP raise significant questions about the planning process. The process was characterized by uncertainty. The potential participants and the mega-project's composition were constantly shifting, as were the legal agreements and the financial commitments. Over fifteen coal properties in the northeast were under active investigation, each progressing at a different speed. By 1977, four properties were apparently past the feasibility stage and well into planning activities concerned with engineering design and environmental impact analysis, but the pair of properties apparently considered closest to proceeding by the government's planners did not end up being the pair that eventually went ahead. Yet much of the provincial government's analysis and evaluation was completed in this early phase, and was based on assumptions that eventually all four properties, and more, would be developed.

The planning process extended over a considerable period of time, and planning activity rose and declined with the expectations and intentions of the private sector participants. During the slow period, the government did not re-allocate the planning budget or resources to other activities and the key political advocates devoted considerable efforts to promoting the NECP, indicating that considerable momentum had been established within the public sector during the first active phase of planning. This momentum may have been reinforced by the symbolic meaning associated with the NECP. This mega-project was portrayed as a key element in BC's long term economic development strategy. In addition, it represented a significant technological achievement, and was at times portrayed as a signal to the world that BC was a stable supplier of natural resources.

During the active phases, enormous pressure was put on the planning process to meet the deadlines of the private sector proponents, who were responding to pressures from the JSI, and planning activity was intense. The active planning periods were also characterized by conflict in negotiations among the participants, and this conflict was particularly intense

during the last phase. The provincial and federal governments had acrimonious discussions over infrastructure issues that were not resolved until the last minute. The coal companies and the JSI were constantly redefining their requirements and interests. Negotiations between the coal companies and the governments were often acrimonious over the coal transportation terms. Even the buyers and the governments had heated discussions over the responsibilities incurred by each in the development of the NECP.

Perhaps the most important characteristic of the NECP planning process was its initial narrow focus, and the narrowing of this focus as time progressed. The goal of the planning process was to ensure that the NECP was a viable undertaking, and that it would contribute to national and provincial priorities, strengthen and diversify the northeast region's economy, and increase the benefits derived from exploitation of the coal resource. However, these goals appeared to be subtly reshaped within the planning process to increasingly focus on overcoming the constraints and minimizing the costs associated with the government's role in providing the infrastructure components of the mega-project. Broader issues, such as whether alternative projects or programs would better serve the economic development goals of the region or whether a second supply source in the province would cause hardship within the southeast, were not adequately addressed. There was no Regional Development Sub-Committee within the planning task force, and many of the regional development issues were taken up by other committees. The lack of opportunity for public input into the process meant there was no check on the narrow focus, nor on the assumptions generated, within the planning process.

In the Chapters that follow, the expectations generated within the planning process regarding the NECP's regional development impacts and economic viability are assessed.

CHAPTER FOUR

THE NECP AND REGIONAL ECONOMIC GROWTH

4.1 INTRODUCTION

Natural resource mega-projects are expected to generate regional economic benefits. Usually, these benefits are defined as growth in employment, income, and population. The NECP was no exception. The provincial government's expectations were clearly laid out by the Premier and by the planning task force, as the following quotes demonstrate.

North East Coal will mean thousands of jobs for British Columbians both in the development of the infrastructure and in the private sector, particularly in the development of mines, for those who will work in facilities, whether it's in transportation, mining or off-loading, and also the spinoff benefit of the multiplier effect on the number of other jobs that it will create for British Columbians and Canadians (Bennett, Hansard 17 June 1980, 2878).

The impact of coal development on the region will be immense. North East British Columbia coal development will ... result in the creation of major employment opportunities in the immediate vicinity of the coal mines and at strategic points on the transportation network ... (BC 1981b, 6).

In the analysis and evaluation phases of the public planning process, the Townsite and Community Development Sub-Committee was responsible for analyzing the NECP's impacts on the communities of Chetwynd and Dawson Creek. However, the impact analysis could only be completed at a conceptual level as the final details on mining plans were unavailable while the planning task force was active. These details became available during the implementation phase, but the planning task force had been replaced by the NECDO, which apparently did not have the mandate to carry out a regional impact study. Consequently, staff within the provincial government conducted the study. It was completed in June 1981, and its purpose was "to assist in and help focus the consultation

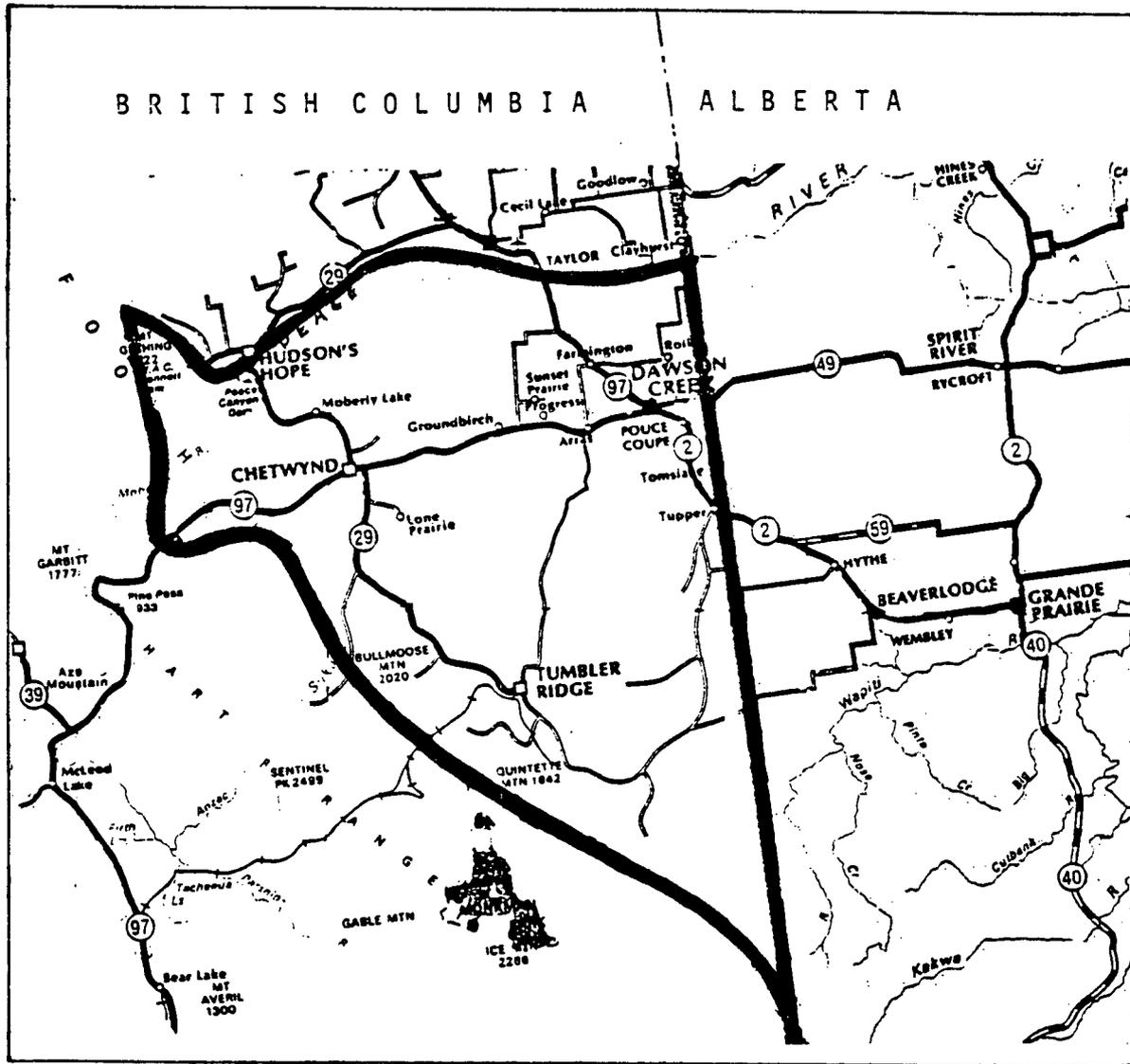
and planning process necessary to prepare the region and its residents for the forthcoming impacts" (BC 1981c, preface). The analysis estimated that 5,133 new jobs would be created in the study region during the operating phase of the two mines, and that over 10,000 people would move to the region by 1986 (BC 1981c). These projections represented increases of 25% to 30% over existing regional employment and population in 1981, thus supporting the high expectations of the politicians and the planning task force.

This chapter reviews the regional impact study to assess whether the expectations it presented and supported were reasonable. The review focuses on the method used to complete the regional demo-economic impact analysis, and the key assumptions made within that analysis. The reasonableness of these assumptions is assessed by comparing them to information available at the time. Additionally, an *ex post* analysis of the NECP's regional demo-economic impacts is completed. The *ex post* analysis provides another reference point for evaluating the high expectations regarding the NECP's impacts on regional economic growth.

The area used for this analysis is the South Peace region of the Peace River-Liard Regional District. This area includes the communities of Dawson Creek, Pouce Coupe, Chetwynd, Tumbler Ridge and Hudson's Hope, plus all the unincorporated and rural settlement south of the Peace River within the boundaries of the regional district (Figure 4.1). This area was chosen because it coincides closely with the region defined in the Province's impact analysis (BC 1981c), captures most of the people who are commuting to work at the NECP, and captures a large proportion of the indirect and induced economic activity associated with the NECP. The scope of this analysis is restricted to the impacts of the NECP's operating phase in 1986.

FIGURE 4.1

SOUTH PEACE STUDY AREA



Scale: 1:2,500,000

Adapted from British Columbia Road Map and Parks Guide 1988/89.

— South Peace Study Area

4.2 THE NECP'S REGIONAL DEMO-ECONOMIC IMPACTS: THE PRE-PROJECT PROJECTIONS AND AN *EX POST* ANALYSIS

For small regional economies, demo-economic impact analyses may begin with an estimate of the economic impact of a proposed project. The total regional impact of the project's expenditures on labour, goods, and services may be estimated by using a method such as economic base analysis or income expenditure analysis. The economic impacts are generally estimated in terms of employment or income, but the income impacts must be converted into employment impacts¹ before proceeding to the demographic impact analysis. Once the total employment impacts have been projected, the regional recruitment rates for the new jobs are estimated.² Then the number of jobs taken by in-migrants may be projected. By applying a population-to-job ratio to the projected number of in-migrants, the total population impact may be estimated (Figure 4.2).³

Demo-economic impact analyses may be combined with base case (without-project) projections of regional demo-economic conditions to generate estimates of total regional employment, income and population.⁴ This was the approach adopted by the provincial government's analysts in the NECP case. Both the base case projection and the impact analysis will be reviewed and evaluated.

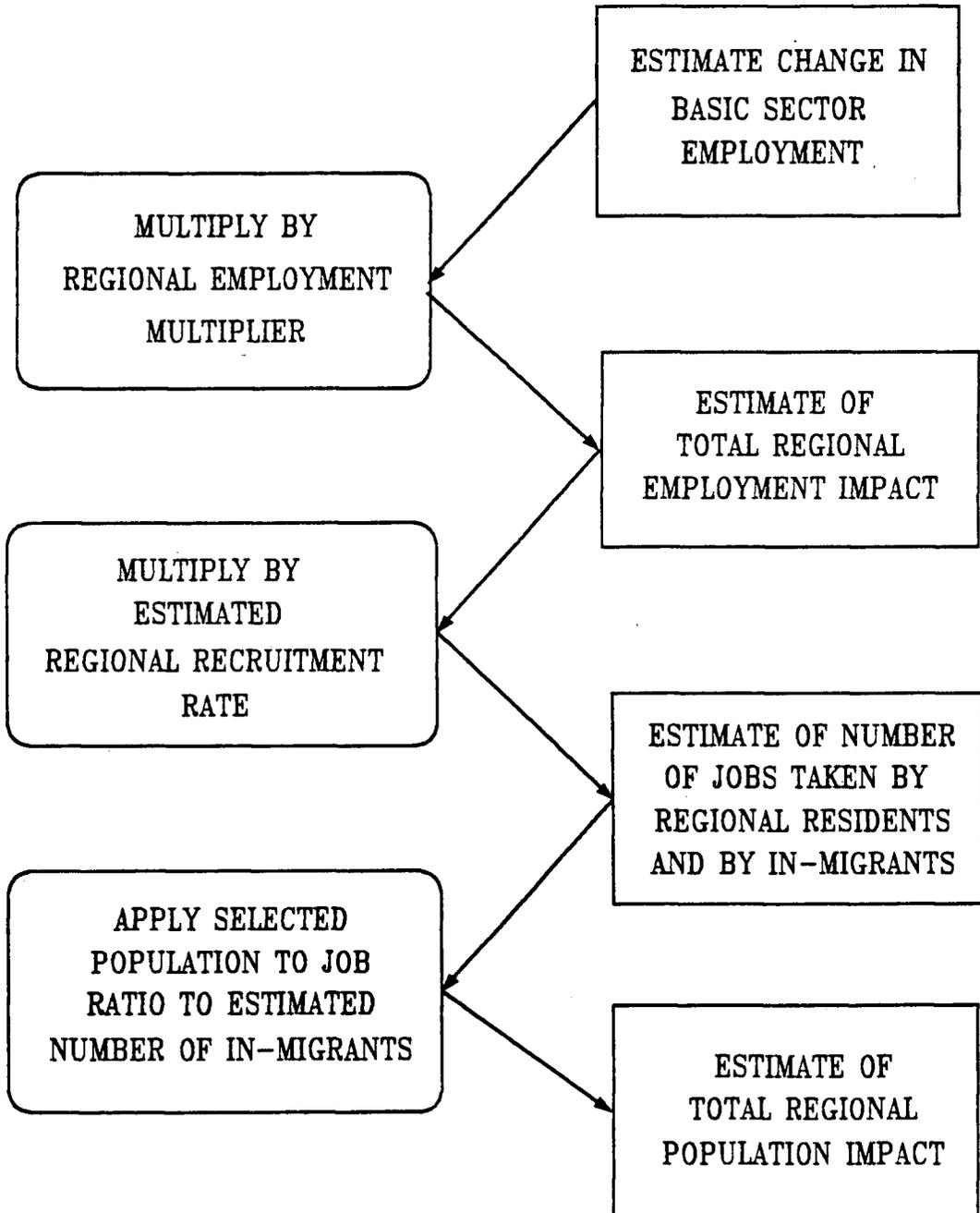
1 This may be done by assuming an average wage for the region or various sectors within the region.

2 *Ex post* analyses of other similar projects may be consulted, or the quantity and quality of the regional labour supply may be compared to the project's requirements.

3 For a thorough discussion of demo-economic impact analysis and parameter estimation procedures, see Knight (1990).

4 A range of techniques may be used to complete base case projections, including ratio techniques and trend line extrapolation (Krueckeberg and Silvers 1974; Isserman 1977).

FIGURE 4.2
FLOWCHART OF DEMO-ECONOMIC IMPACT ANALYSIS



The Projected Impacts

The study region for the pre-project analysis was the Peace River-Liard Regional District. On closer examination of the pre-project study, however, 97% of the regional demographic impacts from the NECP's operating phase were assumed to occur in the South Peace region. Nevertheless, the pre-project analysis was completed based on this larger region, and so in this review the base case and impact projections were adjusted to make them applicable to the South Peace region. Only these adjusted projections are discussed below.

The base case scenario in the pre-project analysis was completed by extending historical population growth rates for the region's communities and rural area into the future. The period chosen for each community's historical growth rate calculations varied according to whether the community had been strongly affected by the construction of the hydroelectric projects on the Peace River during the 1970s, particularly the WAC Bennett Dam. For Dawson Creek and Hudson's Hope, two communities strongly affected by the enormous construction activity in the region during the early 1970s, the analysts used the period from 1976 to 1980 to calculate a population growth rate; for the other communities and the rural area the analysts used the 1971 to 1980 period. The 1980 population estimates were provided by the Central Statistics Bureau in the Ministry of Industry and Small Business Development. The 1971 and 1976 population estimates were taken from the national Census.

The base case scenario suggested the South Peace region's population would be 30,665 in 1986.⁵ While the pre-project analysis did not specify what the region's employment would

⁵ The pre-project analysis used the Peace River-Liard Regional District as the study region, even though most of the demographic impacts were expected in the South Peace area. The population estimates for the larger region were scaled by a fixed factor of 0.52 to make them comparable to the region selected for this investigation, which is the South

be under the base case scenario, it can be estimated by applying a population-to-job ratio to the population estimate. Using the study region's 1976 population-to-job ratio of 2.28, which apparently was the most recent information available to the analysts and so might reasonably have been an estimate used by them, the base case regional employment estimate was approximately 13,450 in 1986.

After the base case analysis was completed, the pre-project analysis estimated the NECP's employment impacts using a modified economic base analysis. In an economic base analysis,⁶ the analyst determines the distribution of regional economic activity between the basic and service sectors of the economy. The ratio of total to basic economic activity is the economic base multiplier. Often, this analysis is completed using employment or experienced labour force⁷ as the proxy for economic activity and thus the multiplier is called an employment multiplier. Rather than estimating a multiplier for the study region, the pre-project analysis surveyed the literature to determine a reasonable value.⁸ Ten studies were reviewed, and after using judgement to adjust the published multipliers for factors such as community and regional size and remoteness, the analysts assumed a regional employment multiplier of 2.5.

In economic base analysis, once the economic base multiplier has been estimated, the change in basic sector activity created by the new project is estimated. This is called the multiplicand. The pre-project analysts used the mining companies' estimate of their operating employment in 1986 (2,053) as the multiplicand. The total regional economic

Peace. The ratio is based on the relationship between the smaller and larger region's populations in 1976.

6 For a detailed outline of the theoretical basis of this technique, its strengths and weaknesses, and empirical procedures, see Appendix 4A.

7 The experienced labour force is comprised of all people in the labour force (i.e. working or looking for work) who have worked during the past year and a half.

8 The pre-project analysts chose to use a published employment multiplier because of the nature of the regional economic data available at the time (from the 1971 Census and strongly influenced by the construction of the WAC Bennett Dam mega-project), and because insufficient time was available to conduct a survey of regional employment.

impact is estimated by applying the multiplier to the multiplicand. The pre-project analysis projected that there would be 4,979 new jobs related to the NECP in the study region in 1986.⁹

The employment impact was linked to a population impact through assumed local hiring rates for the basic and non-basic employment categories. The analysts assumed that 15% of the basic sector jobs and 25% of the service sector jobs would be filled by regional residents,¹⁰ 308 and 732 jobs respectively. These assumptions were based on the analysts' judgement, after considering a number of factors including: relevant work experience or training in the regional labour force, the high likelihood of union certification of the mines, a high interest among regional residents in mining employment, and a commitment by the mining companies to hire locally and regionally to the maximum extent possible. Nevertheless, the analysts argued that

In view of the uncertain availability of qualified training candidates it is estimated that between 10% and 20% of the mining workforce will be recruited from the region. The 10% figure alone represents a significant attraction of regional workers while the higher estimate would require successful programs to hire traditionally under represented groups such as Natives, women, high school leavers etc. (BC 1981c, 37).

The analysts argued that regional recruitment into service sector employment opportunities during the operating phase would be lower than during the construction phase because the long-term nature of the employment would encourage more people to move to the region. The analysts had assumed that 35% of the indirect and induced construction jobs would be filled by regional residents, but that only 25% of the service sector jobs during the operation phase would be taken by regional residents.

⁹ Following the pre-project analysis, this assumes that 100% of the basic jobs and 95% of the service jobs would be located in the South Peace region.

¹⁰ The analysts defined regional residents as individuals who were living in the South Peace region before construction on the NECP began. The definition of a regional resident adopted in this study is very similar. Regional residents are those individuals who were living in the region at the time of the 1981 Census (June 1981), which was also before the construction began.

Once the number of jobs in the basic and service sectors expected to be taken by regional residents was projected, the number that would be filled by in-migrants was determined. In-migrants were projected to take 1,745 of the basic sector jobs and 2,194 of the service sector jobs. The total number of in-migrants, 3,939, was then converted to a total population impact by applying an assumed population-to-job ratio. The analysts reviewed population multipliers in other resource and mining developments and in the service sectors of resource-based communities, and chose 2.5 as a reasonable average of the available estimates. The total population impact was estimated to be 9,848. Finally, the employment and population impacts were added to the base case scenario to produce total regional employment and population projections for 1986 of 18,429 and 40,513, respectively.

The pre-project analysis suggested that the regional impact of the NECP by 1986 would be to create about 5,000 new jobs and add almost 10,000 individuals to the regional population. These were increases of approximately 35% over 1981 population and employment levels, and represented an annual population and employment growth rates of 5.7% and 6.5%, respectively, between 1981 and 1986.

The Ex Post Analysis

In 1986, total employment in the South Peace was 12,190 and the total population was 28,420. There were 6,239 fewer jobs and 12,093 fewer people in the study region than the pre-project analysis projected. In part, this may have been due to the economic recession of the early 1980s as anticipated growth in the regional economy did not materialize. However, the pre-project analysis may have over-estimated the NECP's

regional demo-economic impacts. An *ex post* analysis was undertaken to identify the NECP's demo-economic impacts.¹¹

The *ex post* demo-economic impact analysis used economic base analysis to estimate the regional employment multiplier, but otherwise used the same approach to demo-economic impact analysis as the pre-project analysis. Thus, the basic sector employment related to the NECP was analyzed, and a regional employment multiplier constructed. The NECP's total regional employment impact was then estimated. The proportion of new basic and service sector jobs filled by regional residents was analyzed, yielding an estimate of the number of jobs filled by in-migrants. The total population impact of these in-migrants was analyzed by estimating the average household size of in-migrants into the South Peace region between 1981 and 1986.

Data sources for the *ex post* analysis included specially-ordered cross-tabulations of 1986 Census data for the South Peace region, and the results of sixty-seven interviews conducted in November 1989 with mine management personnel, regional businesspeople, and key regional informants. With respect to this analysis, the purpose of the interviews with the mines' management personnel was to ascertain, as specifically as possible, the pattern of the mines' average annual expenditures, the amount that flowed through regional businesses, the regional businesses receiving the largest proportion of these expenditures, and the number of regional residents that worked for the mines in 1986. The purpose of the interviews with regional businesspeople was to estimate the amount of local-value-added (LVA) as a proportion of their total annual sales, the effect of the NECP on their total annual sales, and the residency of any extra personnel they had hired due to

¹¹ This section focuses on the demo-economic impacts and so an *ex post* base case scenario is not prepared at this point. However, the reasonableness of the pre-project base case scenario is evaluated in the next section.

the NECP.¹² The purpose of the interviews with key regional informants, such as elected politicians and newspaper editors, was to identify any other important businesses or economic impacts related to the NECP. For a summary of the results of these interviews, see Appendix 5A.

The direct component of the multiplicand was estimated from specially-ordered cross-tabulations of Census data for 1986 on the experienced labour force in the coal mining industry, and the unemployment level within that industry. The direct component in 1986 was estimated to be 1,875 jobs. The indirect component was estimated from data obtained in interviews conducted with senior management personnel in charge of the coal mines' purchasing, and with regional businesspeople who supplied goods or services to the mines. Based on that information, total average annual expenditures on new capital equipment, supplies and services by the mines was estimated to be \$148,887,000 (1981\$C), and it was assumed that 70% of these purchases were made through regional businesses. To estimate the number of indirect jobs associated with this \$104,221,000 of regional purchasing, it was assumed that 67% of the regional purchasing occurred through businesses where the LVA was low (10% LVA), and 33% through businesses where the LVA was higher (20% LVA).¹³ Based on these assumptions, the average annual LVA

¹² Owners or managers of businesses supplying goods and services to the mines were identified using the snowball sampling technique. Beginning with the mines' purchasing managers, the regional firms through which the largest purchases were made were identified and these businesses were contacted for interviews. Businesses supplying goods or services to people employed in the coal mining industry and supporting businesses were also identified using the snowball sampling technique, although in this case residents of Tumbler Ridge were asked which regional businesses received the largest portion of disposable income associated with the NECP.

¹³ These LVA estimates are estimates of wages and salaries paid as a proportion of total sales that were derived from interview data where possible, or from the Small Business Profiles for BC that is published by Statistics Canada. The LVA estimates do not include rents and profits accruing to regional residents, nor the LVA component of any purchases they make within the region. Consequently they may be underestimates. However, this is probably compensated for by the estimate that 70% of the mines' purchasing flows through regional businesses. This estimate is based on information obtained from QCL and it was assumed it applied to BOC. This may over-estimate BOC's regional purchasing, as it appeared during the interviews that QCL management were more committed to regional procurement than BOC management.

added associated with the two mines' regional purchasing was estimated to be \$13,861,000 million. The number of indirect jobs generated by this LVA was estimated by assuming an average annual wage for the mine supply sector of \$25,000,¹⁴ yielding 554 indirect jobs. The multiplicand for 1986 was therefore estimated to be 2,429 jobs.

Specially-ordered cross-tabulations of the 1986 Census on the distribution of the region's experienced labour force by industry were used to sector the economy into basic and service sectors, following procedures recommended by Schwartz (1983), and then the multiplier was adjusted for public and private transfer payments into the regional economy as suggested by Gibson and Worden (1981).¹⁵ The resulting employment multiplier estimate was 1.43. Applying the estimated multiplier to the estimated multiplicand, the total regional employment impact of the NECP in 1986 was estimated to be 3,473 jobs of which 1,875 were direct, 554 indirect, and 1,044 induced.

To estimate the population impact of this job creation, the number of direct, indirect and induced jobs actually taken by regional residents was estimated.¹⁶ These estimates were based on: a) specially ordered cross-tabulations of 1986 Census data from Statistics Canada which indicated how many regional residents were working in coal mining and how many were working in indirect and induced jobs in Tumbler Ridge, and b) interviews with regional businesspeople that indicated that most of their hiring had been done from within the regional labour force. In 1986, 280 regional residents were working in the coal mining industry. Therefore, 1,595 direct jobs had been filled by in-migrants. Of the 1,598 indirect and induced jobs related to the NECP, 605 were in Tumbler Ridge and 90 of these

¹⁴ This wage estimate was obtained from Statistics Canada's publication Survey of Employment Payroll and Hours, Catalogue 72-002. The average wage for the goods producing industry in BC was assumed to be a reasonable estimate of wages in the mining supply industry.

¹⁵ For further details regarding the construction of this multiplier, see Appendix 4A.

¹⁶ Regional residents were defined as those individuals who lived in the study region at the time of the last Census, which captures the pre-project time period in the region.

had been filled by regional residents. The remainder of the indirect and induced jobs in Tumbler Ridge, amounting to 515 positions, had been filled by in-migrants. The remaining 993 indirect and induced jobs in the region were located in the other communities and it was assumed that all of these jobs had been filled by regional residents. Therefore, in 1986 it was estimated that a maximum of 1,363 (39%) of the 3,473 jobs related to the NECP had been filled by regional residents, and that a minimum of 2,110 (61%) of the regional jobs related to the NECP had been filled by in-migrants. Specially-ordered cross-tabulations of 1986 Census data suggested that the population-to-job ratio for in-migrants into the South Peace between 1981 and 1986 was 3.0, the population impact of these in-migrants was 6,330. The pre-project and *ex post* analyses are summarized and compared in Table 4.1.

TABLE 4.1
SUMMARY OF PRE-PROJECT AND *EX POST*
DEMO-ECONOMIC IMPACT ANALYSES

Variable	Pre-Project	<i>Ex Post</i>
Multiplicand	2,053	2,429
direct component	2,053	1,875
indirect component	0	554
Multiplier	2.5	1.43
Employment Impact	4,979	3,473
Regional Recruitment Rate	15% (basic) 25% (service)	15% (direct) 68% (indirect & induced)
Population-to-Job Ratio	2.5	3.0
Population Impact	9,848	6,330

While this may be a relatively accurate reflection of the number of jobs and people in the region that are linked to the NECP, it may be unreasonable to suggest that employment and population levels in 1986 would have been 3,473 and 6,330 less than they actually were had the NECP not been undertaken. Regional responses to declining levels of economic activity may not be completely expressed as layoffs and outmigration, particularly when conditions elsewhere are not perceived to be any better (Isserman 1985). Underemployment and transfer payments may increase, and people may prefer to stay in the region rather than move.

The comparative region approach to completing *ex post* impact analyses attempts to address this issue. A similar region or set of regions that did not have the experience of the study region is chosen as a control, and it is assumed that the study region would have followed the trends exhibited within the control region in the absence of the project. Differences between the trend and the region's actual experience are attributed to the impact of the project.

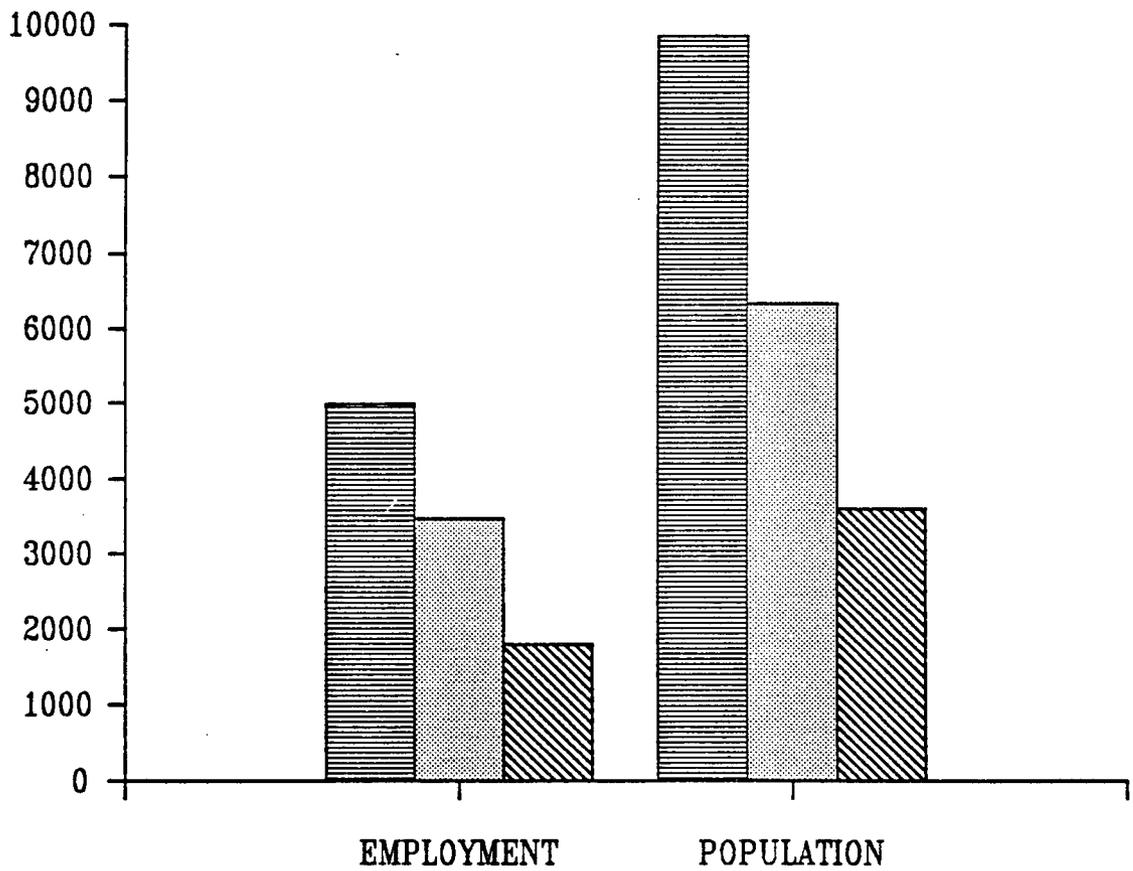
There are a number of problems with the comparative region approach to *ex post* impact analysis. Selecting the region or set of regions to serve as the control is not easy. Finding a region that is similar, in terms of its size and economy, to the study region but was not affected by the project or the factors underlying the project is difficult. If a similar region cannot be found a larger region may be selected, perhaps by grouping together a number of regions. Another problem with using the comparative region approach is that one must assume the study region would have experienced the same trends as the control region. While this may be highly probable, the assumption weakens conclusions drawn from a comparative analysis.

Despite these weaknesses, the comparative region approach was used in a second *ex post* analysis of the demo-economic impacts of the NECP. The control region selected for the analysis was BC's resource-based regions. Between 1981 and 1986, BC's resource-based regions lost 31,325 jobs, a decline of 5.77% from 1981 employment levels. Population in BC's resource-based regions, however, remained stable, growing by 4,287 individuals which was an increase of 0.35% over the 1981 level. Assuming that the South Peace area would have experienced similar trends in the absence of the NECP,¹⁷ total population and employment in 1986 could have been 24,822 and 10,404 respectively. This suggests the minimum impact of the NECP was to create approximately 1,800 jobs and add 3,600 people to the region (Figure 4.3).

Using either of the *ex post* analyses completed here, the impact of the NECP on regional employment and population has been far less than the Province's expectations (Figure 4.3). The number of direct jobs in 1986 was less than expected, and the multiplier was much smaller than assumed in the pre-project analysis. Also, a larger number of jobs were taken by regional residents, particularly in the indirect and induced employment categories, than assumed in the pre-project analysis. In the next section, a detailed review of the pre-project analysis is undertaken to assess whether the techniques and assumptions used in that study were reasonable, given information available at the time.

¹⁷ It could be argued that the South Peace region more closely resembles Alberta's resource-based regions than BC's because of its geological, geographic and climatic similarities. However, the South Peace region is sufficiently similar, industrially, to the aggregate of BC's resource-based regions that the analysis completed here is reasonable. However, the control region is much larger than the study region, and thus we might expect the employment and population impacts to be under-stated.

FIGURE 4.3
COMPARISON OF EMPLOYMENT AND POPULATION IMPACTS,
PRE-PROJECT AND EX POST ANALYSES



Pre-Project Projection



Ex Post Analysis Using Demo-Economic Impact Analysis Approach



Ex Post Analysis using Comparative Region Approach

4.3 EVALUATION OF THE PRE-PROJECT ANALYSIS

There may have been a methodological inconsistency in the pre-project analysis, stemming from the definition of the basic sector used to estimate regional employment impacts. In that study the basic sector was atypically defined as the employment in the mining operations, i.e. the activity resulting directly in regional exports. Activities indirectly resulting in regional exports by supplying goods or services to the mining sector were not included in the basic sector. Thus the multiplier in the pre-project analysis related direct employment to the sum of indirect and induced employment, and assumed that for every new job in the direct sector, 1.5 jobs would be created in the indirect and induced sectors. The following quotes are from Appendix A, titled Multiplier Methodology, of the pre-project analysis.

Basic operating employment - all activity which results in export from the region is considered basic. In the case of North East coal, the coal mining operations will provide the basic employment.

Non-basic operating employment - all activity which is not exported, i.e. which services the basic activity is termed non-basic. The non-basic sector generates additional non-basic employment in the servicing of itself. In the area under consideration in this study, non-basic activity will include some employment in maintenance and operation of the road, power line and rail developments, but more significantly the more people-oriented types of services described in the discussion of induced construction employment. (BC 1981c, Appendix A, 3).

The definition of the non-basic, or service, sector in the pre-project analysis is not very clear. It contains no reference to the indirect employment that would be created in regional supply businesses linked to the coal industry. One must assume that it was included in the service sector because the definition of the basic sector is quite clearly restricted to the coal mining operations.

Massey (1973) and Armstrong and Taylor (1985) have noted that there can be ambiguity in the definition of the basic sector. Massey (1973) argued that the typical definition of the basic sector to include all direct and indirect activity linked to exports could logically result in an entire economy being defined as the basic sector. Armstrong and Taylor (1985) defined the basic sector as those firms that are directly exporting goods or services, but note that should a basic sector firm take over a service sector firm that it was purchasing supplies from, the service sector firm would be reclassified to the basic sector. Schwartz (1983) and Davis (1990) argued that the basic sector should be defined as all activity directly or indirectly linked to exports, and this is generally the definition used in most North American economic base analyses.

Unfortunately, there is no discussion of this issue in the pre-project analysis. The reasons for adopting the particular definition of the basic sector used in the pre-project analysis are not presented, nor is the effect of this definition on the multiplier value discussed. To determine whether the studies reviewed to select a multiplier adopted the same definition of the basic sector as the pre-project analysis did, all of the background studies that could be found were consulted. Of the ten studies consulted by the pre-project analysts, six were available and all of these studies that contained an economic base analysis defined the basic sector to include direct and indirect economic activity linked to exports. Thus, the multipliers derived in these studies were not directly transferable to the pre-project analysis. However, there is little discussion of the factors taken into account by the pre-project analysts in choosing a final multiplier value. Community size and remoteness were considered; but no mention is made of any adjustments for the differing definitions of the basic sector.

If the pre-project analysts attempted to correct for the differing definitions of the basic sector between their study and other studies by increasing the size of the employment

multiplier using judgement, which it appears is what they did, the accuracy of any projected employment impacts would be suspect. A more rigorous analysis of the indirect employment generated by the NECP, such as that completed in the *ex post* analysis in the previous section, would have increased the confidence in the results.¹⁸ However, despite the apparent methodological problems the pre-project impact projections were presented in such a way that they could be taken as accurate and precise by a reader. No ranges or sensitivity analyses were presented, except for the statement that the projections were expected to be accurate within a range of 20% below and 10% above the numbers presented.

This apparent methodological inconsistency may have resulted in overestimation of the NECP's regional employment impacts in the pre-project analysis, caused by the use of an excessive employment multiplier. To judge whether the pre-project multiplier was reasonable, estimates published in the studies that were consulted by the pre-project analysts were reviewed. Six of the ten documents listed were examined, and in all of these the employment multiplier used was significantly less than 2.5. Even if the pre-project multiplier is adjusted for the variation in the basic sector definition (see previous footnote), the published employment multipliers were still lower.

Davis (1976) suggested the employment multiplier for Prince George, an urban centre in the BC interior with a population of 60,000, was 2.06. Two of the listed reports were directly related to the NECP: the employment multipliers used in the Stage II submissions of the Sukunka and Quintette coal properties were approximately 1.5. In the Greenhills Stage II report, a proposed coal mine in southeast BC, the employment multiplier was approximately 1.4, and in that report it was suggested that an employment multiplier of

¹⁸ If one assumes that the pre-project estimate of indirect employment would have been similar to the *ex post* estimate, the pre-project employment multiplier can be recalculated. The projected total employment impact divided by the change in basic sector employment (direct and indirect jobs) yields a multiplier of 1.9.

1.8 would apply to a population of approximately 18,000. The Grizzly Valley Pipeline study (Westcoast Transmission Company Ltd. 1979) did not contain an estimate of an income or employment multiplier, nor any information that would allow an estimate to be made. The Ridley Island port study (BC 1980) used an employment multiplier of 1.60 for the operating phase of the project. One other document listed as a source in Appendix C of the pre-project analysis is a background report to Davis (1976), and it is unlikely it would contain suggestions that an employment multiplier of 2.5 would be appropriate for the South Peace area. To supplement the review, several other coal development assessments that were submitted to the BC government during this time period were examined. The employment multipliers were generally around 1.5 (Quinsam Coal 1980; Petro Canada 1981; Sage Creek Coal 1976).

Based on the background documents, the pre-project analysis appeared to over-estimate the employment multiplier for the study region. This was investigated further by examining employment multiplier estimates published in the literature and available at the time the pre-project analysis was completed. These estimates are summarized in Table 4.2.

The published estimates particularly relevant to the NECP impact analysis are the ones contained in Patching et al. (1980), Murdock and Leistritz (1979), and Nickel et al. (1978). The study by Patching et al., published in 1980 and concerned exclusively with the coal industry in western Canada, suggested employment multipliers for Western Canada would be in the range 1.6 to 1.9 and that local multipliers, which would correspond more closely to the South Peace region, would be between 1.2 and 1.6. Murdock and Leistritz (1979), after reviewing many studies of large-scale energy development in rural areas of the western United States, reported that employment multipliers used to project the impacts of the operational phase of coal mines were around 1.7 to 1.9, and when a gasification or

TABLE 4.2
EMPLOYMENT MULTIPLIERS:
SELECTION OF PUBLISHED ESTIMATES, 1980

Source	Location/Project	Multiplier	
Weiss & Gooding 1968	Portsmouth, New England, USA		
	(private sector)	1.8	
	(public sector)	1.4	
Greig 1971	Scottish Highlands		
	Pulp & Paper Mill	2.1 - 2.4	
Brownrigg 1973	Stirling University		
	Population = 100,000	1.36 - 1.7	
Brownrigg & Greig 1975	Isle of Skye, UK	1.05 - 1.18	
	Tourism		
Davis 1976	Prince George, BC	2.06	
	Steel Mill		
	Population = 60,000		
Nickel et al. 1978 (all mining)	British Columbia	2.24	
	Alberta	2.2	
	Saskatchewan	2.30	
	Manitoba	1.93	
	Ontario	2.41	
	Quebec	2.57	
	New Brunswick	2.25	
	Nova Scotia	2.47	
	Prince Edward island	1.34	
	Newfoundland	3.35	
		Pine Point, NWT	1.26
		Population = 2,350	
		Schefferville, PQ	1.20
		Population = 3,178	
		Grande Cache, ALTA	1.45
		Population = 3,500	
		Hinton, ALTA	1.64
	Population = 4,911		
	Malartic, PQ	1.77	
	Population = 6,998		
	Wabana, NFLD	1.64	
	Population = 8,028		
	Flin Flon, MAN	1.83	
	Population = 11,104		
	Noranda, PQ	2.35	
	Population = 11,477		
	Western Crows Nest Pass	1.69	
	Population = 11,500		
	Trail, BC	2.53	
	Population = 11,580		
Murdock & Leistritz 1979	Western USA	1.7 - 2.5	
	Large-scale energy development in rural areas (coal mining)		
Patching et al. 1980	Western Canada Coal Mining		
	Input-Output Model estimate	1.63	
	Candide Model estimate	1.97	
	Local Economic Impacts of Operational Phase	1.25 - 1.6	

electricity generation plant was included in the project the multiplier increased into a range of 2.0 to 2.5. Murdock and Leistriz were careful to note that these multipliers represented multi-county multipliers; for smaller areas, the multiplier would be less than the ones suggested in their report. Nickel et al.'s (1978) review of published estimates suggested the employment multiplier for mining in BC was 2.24, and that for mining communities without smelter operations the employment multiplier was somewhere in the range of 1.2 to 1.8.

Based on these studies, a reasonable choice for an employment multiplier would have been in the range of 1.3 to 1.7, not 2.5 as used in the pre-project analysis.¹⁹ In addition, while reviewing planning documents related to the NECP, it was found that the Townsite Sub-Committee had recommended that a reasonable employment multiplier for the study region was 1.7 for short-term analyses (5 years) and 2.0 for long-term analyses (10 years) (BC 1977d). Therefore, the employment multiplier used in the pre-project analysis was high.²⁰

The other important component in estimating the NECP's regional economic impacts was the multiplicand. The pre-project multiplicand estimate did not consider any potential variation in labour productivity or coal production. The number of direct jobs associated with the project in 1986, estimated at 2,053, was provided by the mining companies, and was based on total annual production levels of 7.7 million metric tonnes (MMT). The coal contracts specified that this volume +/-5% would be taken on an annual basis, thus total production could range between 7.32 MMT and 8.1 MMT annually. If employment is

¹⁹ Even the adjusted pre-project multiplier of 1.9 is outside this range.

²⁰ An additional factor that may have affected the selection of an employment multiplier in the pre-project analysis is that the employment multiplier is for the Peace River-Liard Regional District which is about twice the size of the South Peace region. However, the pre-project analysis, while appearing to deal with the entire Regional District, was really only examining employment impacts in the South Peace. If the analysts were using the size of the Regional District rather than the South Peace to scale the employment multiplier, this also could have biased the estimate upwards.

assumed to vary directly with production levels, the direct mining employment in 1986 could have been expected to vary between 1,952 and 2,160. Yet, the pre-project analysis did not consider any variation in direct employment. This should have been included in the impact analysis. The pre-project multiplier estimate, because of the basic sector definition used, did not include any indirect employment which compensated, to some degree, for the high employment multiplier used.

After estimating the NECP's regional employment impacts, the pre-project analysis estimated regional recruitment rates into these new jobs. After considering the potential labour supply in the region, the existing levels of skills and training and other factors such as the degree of union hiring, the pre-project analysis estimated that 15% of the direct operating jobs and 25% of the indirect and induced jobs would be taken by regional residents.

There is not a great deal of information in the literature on the question of local hiring rates for coal mines.²¹ Consequently, it is difficult to evaluate whether the pre-project estimates were reasonable. A report on western Canada's coal industry (Patching et al. 1980) estimated that in-migration related to coal mining may range between 50% and 75% of the total operational employment created. The manpower study completed for the construction phase of the NECP (BC Research 1978) estimated that a maximum of 25% to 35% of the construction jobs would be available to regional residents. BP Canada, in its Stage II submission for the Sukunka coal deposit in the North East, estimated local hiring rates would be 15% in construction and 10% in operations (BP Canada Ltd. 1979). In light of this information, the assumptions in the pre-project analysis were reasonable.

²¹ Murdock and Leistriz (1979) summarized the results of studies that examined the rate of local hiring but were only able to suggest that the rate of local hiring will vary with the size of the project and its proximity to major population centres. The reported rates ranged from 30% to 90%, with the higher rates of local hire associated with smaller projects, or projects located near major population centres.

Estimating the population impacts associated with in-migration requires the assumption of a population-to-job ratio. The ratio chosen may be the historical ratio in the region, the provincial or national average, or a ratio based on migration studies. The pre-project analysis based its choice of 2.5 on population-to-job ratios gathered in resource and mining developments, and in the service sector of resource-based communities. This estimate was reasonable; the population-to-job ratio in the South Peace region was approximately 2.3 in 1976, and the mining companies indicated that they would be encouraging people with families to move to the area.

Finally, the base case scenario prepared in the pre-project analysis utilized the technique of trend line extrapolation. Using historical growth rates presumes that the conditions of growth, stability or decline that prevailed during the period over which the rates are calculated will continue for the projection period. For a small regional economy like the South Peace, which has experienced a series of mega-projects since World War II, this assumption is a precarious one. One way to increase the level of confidence in the base case projection is to prepare several projections using different techniques and varying assumptions, thus producing an indication of the sensitivity of growth to various assumptions, and a range to choose from. Another way is to check the projection against others made for the area, or for a larger area of which the study region is a part. The pre-project analysis did not report the results of any such checks. These checks can be done in hindsight, however, and the results are reported below.

The pre-project analysis projected that the population of the South Peace region would be 30,665 by 1986. In September of 1979, BC Research, under contract to the Province of British Columbia, published population projections for BC and all its Regional Districts.

These rigorous projections²² were intended to "serve as the commonly accepted basis for most forecasting and planning studies in British Columbia" (BC Research 1979, 2). According to the BC Research analysis, the population of the Peace River-Liard Regional District would reach 47,158 by 1986; for the study region this corresponds to a population of 24,522.

This projection is 20% lower than the government's base case projection and raises significant questions regarding the technique and data employed in preparing this aspect of the pre-project analysis. The 1980 population estimates supplied to the analysts by the Central Statistics Bureau may have been too high, leading to over-estimated historical growth rates. However, the real issue is the reasonableness of using historical growth rates to prepare population projections in small, open regional economies. A more appropriate approach may be to use ratio-based techniques (Krueckeberg and Silvers 1974; Isserman 1977b; Isserman 1984). At the very least, a range of projections should be prepared and presented if historical growth rates are to serve as the basis for projections.

22 BC Research used the cohort-survival technique to project population growth, beginning with birth and death data at the School District level. Population projections were made at the School District level and then aggregated up to the Provincial level, where a migration factor was added. The provincial population forecasts were then disaggregated back down to the School District level and any variation between the original forecast and this one was assigned to the net residual migration factor. For certain School Districts known or expected to have a stronger migration factor, special adjustments were made. Population projections by BC Research, prepared in 1974 using a similar method, were compared to other projections and to actual 1976 Census results to check the accuracy of the model before preparing the new projections. At the provincial level, the model was found to produce very accurate results. However, at the regional level the projections were more variable, and so changes in the model and procedures were made to improve the model's forecasting accuracy before the new set of projections were prepared.

4.4 SUMMARY

The NECP's regional demo-economic impacts have been far below the levels projected. The pre-project analysis suggested that approximately 5,000 jobs would be created in the South Peace region, and that nearly 10,000 people would move to the area. The actual impacts have been significantly less; in 1986 about 3,500 jobs in the South Peace were related to the NECP, and the population impact of these jobs was approximately 6,330 people.

Several factors probably contributed to the lower impacts than expected. First, the output from the mines has been significantly lower than expected. QCL is not selling thermal coal, and labour productivity at BOC is better than expected. Thus, total direct employment in 1986 was 1,875, not 2,053. Second, regional economic growth in the late 1970s and early 1980s was slowing. Construction of the Peace Canyon Dam was winding down, and the recession of the early 1980s forced commodity markets into a severe decline. Both of these factors suggest that the region lost other export-oriented employment, and that unemployment, particularly among the skilled labour force, increased. The NECP may simply have replaced some of these lost export-oriented jobs, and absorbed some of the unemployed workers. This had a stabilizing influence, but did not produce growth. Third, there may have been significant excess capacity in the regional economy, particularly in the supply and service sectors so that the increased demand generated by the mines and the direct employees was absorbed within the existing economy without significant expansions. Or, regional businesses could have increased their productivity. Fourth, the leakages from the regional economy from the direct employees' purchases, could have been much higher than anticipated,²³ lessening the income and employment impacts within the regional economy. Finally, net in-migration

23. See Chapter 5 for a fuller discussion.

was much lower than anticipated because of higher local hiring rates in the indirect and induced sectors. This was probably related to the recession and the increased availability of labour within the region. All of these factors were probably operating in the South Peace region and account for a portion of the lower-than-expected impacts.

In addition to these factors, the over-estimate of the NECP's demo-economic impacts is apparently linked to a methodological inconsistency in the pre-project analysis. The definition of basic and non-basic activity used to analyze the NECP's regional employment impacts was atypical, and thus the relationship described by the employment multiplier was atypical. When the literature available to the pre-project analysts was reviewed, the majority of these studies were found to have defined the basic sector differently from the pre-project analysis. Therefore, these studies' employment multipliers had to be adjusted upwards to be used in the pre-project analysis. These adjustments were in addition to ones required to fit the published multiplier estimates to the study region's characteristics. As a result of this atypical definition of the basic sector, the pre-project employment multiplier is much higher than any of the published estimates. This was compensated for, to a degree, by the exclusion of indirect employment from the basic sector which resulted in a lower multiplicand.

The pre-project analysis did not discuss the rationale for employing an atypical definition of the basic sector, and despite having an appendix devoted to discussing the multiplier methodology, there is no indication of the assumptions that were behind choosing an employment multiplier of 2.5. The large amount of judgement required to use this atypical approach, and the lack of discussion in the report, raise questions about the confidence limits surrounding the impact projections and the technical adequacy of the pre-project analysis.

Another technical issue in the pre-project analysis was the definition of the study region as the Peace River-Liard Regional District. The employment multiplier was apparently developed for this region, despite expectations that the majority of the demo-economic impacts from the operating phase (97%) would occur within the South Peace region, which has approximately half of the Regional District's population. Use of the larger region as the study region was inappropriate, and it may have contributed to the over-estimate of the employment multiplier. Given similar settlement patterns, regions with larger populations may be expected to have larger employment multipliers. However, the sparse settlement pattern of the Regional District and its open economy do not justify an employment multiplier of 2.5, or even the adjusted multiplier of 1.9.

Additional questions regarding the technical quality of the pre-project analysis are raised by its base case scenario. Despite the dramatic changes in population growth rates during the 1970s, the pre-project analysts chose the technique of trend-line extrapolation to prepare a base case scenario. This was not an appropriate approach, particularly when a rigorous projection for the region was already available. Further, the available projection was considerably lower than the one prepared in the pre-project analysis.

The methodological and technical questions regarding the pre-project analysis raise significant concerns about the review process for that study. The study was completed by government staff and reviewed by senior members of the planning task force. It was used as the basis for discussion of potential regional impacts with communities in the northeast region. Yet, it appears that insufficient attention was devoted to the study's production and review, and consequently the regional demo-economic impacts were over-estimated.

This leads to an additional criticism of the pre-project analysis. Except for one brief phrase in the introduction to the report, the pre-project analysis did not discuss the

potential variability of the impact projections. There is considerable uncertainty associated with most of the key estimates in the demo-economic analysis - the multiplicand, the multiplier, the regional recruitment rates, and the population-to-job ratio. The pre-project analysis should have completed a number of sensitivity analyses to show the effect of reasonable variation in these parameters on the magnitude of the impact projections. Recognition of uncertainty should lead to flexible impact management processes. Instead, the pre-project analysis ignored this uncertainty, impacts were over-estimated, and expectations were raised to very high levels regarding the NECP's contribution to regional economic growth.

CHAPTER FIVE

THE NECP AND REGIONAL ECONOMIC DEVELOPMENT

5.1 INTRODUCTION

Prior to the 1970s, economic development was equated with aggregate economic growth (Seers 1969; Arndt 1978; Friedmann and Weaver 1979). The most common economic development yardstick was growth in a nation's or region's gross national product, although growth in average per capita incomes was occasionally used as well. The implicit assumption required to equate growth with development is that the benefits of economic growth will trickle down and spread throughout society, thus raising the material well-being of everyone. Social costs associated with economic growth are assumed to be small and transitory, or not recognized at all.

The inadequacy of this conceptualization of development was gradually revealed during the late 1960s, particularly through the experiences of economic planners in developing countries. Although aggregate economic growth was observed, poverty and unemployment levels showed little improvement, inequality increased, and social and political difficulties appeared (Seers 1969). Increasingly the meaning and measurement of development were reconceptualized by theorists and practitioners. Seers (1969) argued that the universal goal of development was the achievement of human potential, and that to do this people must have their basic needs met, and they must have work that provides them with self-respect. Further he suggested that gross inequality was an impediment to the development process because it prevented people at the bottom of the socio-economic ladder from moving up. Consequently, Seers argued that development planning must focus on reducing poverty, unemployment and inequality. For Seers, if the benefits of technical progress accrued to minorities who were already relatively rich, this was not development.

In his seminal article on the meaning of development Seers (1969) argued that the development process was much more complex than the combination of land, capital, labour and technology to produce and distribute goods and services. He suggested that entrepreneurship and education also played a key role in the development process. Many other development theorists agree with Seers' arguments (Friedmann and Weaver 1979; Arndt 1987), and development planning now often includes institutional and training components. Also, assessments of economic development tend to use a broad range of indicators.¹

Some regional planners provided fresh insights on the development process when they argued that the way particular projects² were planned had an important influence on the development impacts. During the 1970s, top-down, centralized control of the planning process was linked to large, capital-intensive, high technology regional development projects that failed to reduce inequality, poverty or unemployment (Moris 1981; Stohr and Taylor 1981; Friedmann and Weaver 1979), and to failures of smaller-scale projects oriented to meeting basic needs using appropriate technology (Jain 1985; Esman and Uphoff 1984; Ralston et al. 1983). However, the alternative approach of bottom-up, more decentralized planning has not yet been completely accepted as a necessary condition for regional development. The emerging hypothesis appears to be that a bottom-up approach is more likely to produce individual and social learning, qualitative improvements in a region's or community's planning and doing capabilities, and economic development strategies more appropriate to the needs and resources of the region or community (Korten and Klauss 1984). These are important elements in the development process.

1 The potential range of indicators will be discussed in the following section.

2 Or policies and programs.

Economic growth can occur but yield no economic development if the benefits of growth, including individual or social learning or entrepreneurial development, accrue to those who are relatively well-off. This kind of growth does little to alleviate poverty, unemployment or inequality. Economic growth can occur and yield economic development but the benefits of growth must be spread through society so that inequalities are reduced. Economic development can occur without economic growth if individuals who are lower on the socio-economic ladder improve their learning or doing capabilities and thus lessen inequality and hopefully, unemployment and poverty.

The provincial and federal governments' expectations were that the NECP would generate regional growth and development. The governments' explicit expectations were focused on employment creation and population growth; these are aggregate growth impacts. The NECP's impacts on regional unemployment or poverty, or on the distribution of income or the enhancement of entrepreneurial capabilities were not discussed. However, the governments' broader development expectations were expressed indirectly in a number of planning documents. The North East Report (BC 1975) emphasized that the coal resource could provide

... a major opportunity for regional economic development and diversification ... (and could serve as) ... a catalyst for the future growth of the transportation, construction, trade, and services sectors in the region's economy. (BC 1981b, 9).

The stated purpose of the Subsidiary Agreement to Evaluate North East Coal and Related Developments was

... to provide for a joint examination of possible coal development in northeast British Columbia ... (to) help ensure that any potential development would:

- a) contribute to the realization of national and provincial priorities;
- b) strengthen now and for the future the economy of northeast British Columbia by re-directing and diversifying the economic focus; and
- c) increase the benefits from utilization of the resources of the northeast coal region. (Canada 1977, 3).

Finally, one of the summary planning documents stated that

The impact of coal development on the region will be immense. North East British Columbia coal development will not only result in the creation of major employment opportunities in the immediate vicinity of the coal mines and at strategic points on the transportation network, but could also have a positive impact upon other sectors of the regional economy. Ancillary industries to assist in the service, supply and maintenance of coal mining operations will identify an opportunity to become established in the area and will add considerable strength and diversification to the local economic base. (BC 1981b, 6).

In addition, the Comprehensive Agreements negotiated between the Province and the mining companies indicated the government's interest in maximizing regional procurement and employment by the mines, and the planning task force emphasized the importance of providing employment opportunities for regional residents such as Natives who were traditionally under-represented in large-scale resource development projects like the NECP.

The NECP planners were well aware of the barriers that needed to be overcome to ensure that the NECP contributed to regional economic development. The Manpower Subcommittee and the majority of its consultants stressed the need for specially-developed recruitment and training programs, and for support facilities and programs to ensure that regional residents, particularly members of target groups, had the maximum possible opportunities for coal mining employment (van Dyke 1976; Veit 1976; Peat Marwick 1978). However, as the review of the NECP's planning process suggested, very little regional development planning was implemented and few, if any, efforts were made to ensure that regional residents were able to capture the NECP's benefits. This chapter assesses the regional development impacts of the NECP.

5.2 METHOD

There are a number of different approaches to assessing the impacts of a regional policy or project including time series analyses (Armstrong and Taylor 1985), regional comparisons (Diamond and Spence 1983; Folmer 1986), and simulation modelling (Folmer 1986; Armstrong and Taylor 1985). These approaches generally attempt to compare the behaviour of selected regional variables during a policy-on period to their hypothetical behaviour had the policy not been implemented. This hypothetical behaviour may be extrapolated from historical regional trends, from contemporary trends in other regions, or from models that link the selected regional variable(s) to other factors such as national investment levels. All approaches have strengths and weaknesses, and none is completely satisfactory.

The method developed to analyze the NECP's impacts on regional economic development involves:

- a) development of a set of criteria and indicators,
- b) assessment of temporal changes in these indicators over the 1981 to 1986 time period by comparing the study region to another 'control' region, and
- c) assessment of the intra-regional distribution of any changes in these indicators.

The major assumption underpinning the comparative region approach is that the study region would have followed the trends of the control region in the absence of the policy or project. The reasonableness of this assumption is improved if the two regions are similar but the control region was completely unaffected by the policy or project. However, it is difficult to identify control regions in practice. Thus whether the trends they experienced during the relevant time period would apply to the study region may be challenged. The results from a comparative region analysis must therefore be interpreted with caution.

The first task is to develop a set of indicators that will reasonably reflect regional economic development impacts. The indicators must cover a broad range of factors yet be accessible at a reasonable cost. The major indicators traditionally used in assessments of Canadian regional policy are population growth rates, unemployment rates, and average per capita incomes.³ These indicators do not fully reflect all the factors emphasized by regional development theorists, nor were they meant to '... tell the whole story about regional differences in the welfare of individuals.' (ECC 1977, 56). Despite this, these three indicators, with slight variations, continue to be the ones most commonly employed in discussions of regional disparities and regional policy (Armstrong and Taylor 1985; Savoie 1986).

Savoie (1986) argued that regional disparities should be defined in broader terms more relevant to the economic 'health' of regions. In addition to population growth, unemployment rates, and average per capita incomes, he suggested the following indicators: personal transfers from governments as a percentage of personal income, manufacturing employment as a percentage of total employment, labour productivity in all industries, the abundance and quality of the natural resource base, the size of the potential labour force, and the educational levels of the labour force. Savoie argued these indicators provide information on other elements of the economic development process that are not illuminated when the standard trio of indicators is used. In agreement with him, this research uses a broad set of indicators to analyze the NECP's impacts on regional economic development.

Several of Savoie's (1986) proposed indicators are used in this research. These are: the unemployment rate, average per capita incomes, average household incomes, educational levels in the population, and personal transfers from governments as a percentage of total

³ See for example, Economic Council of Canada (ECC) (1977).

personal income.⁴ Several other indicators are added to address issues raised by Savoie and other regional development theorists (Seers 1969; Myrdal 1957; Hoover 1971; Perloff 1963; Friedmann and Weaver 1979). These indicators are: the distribution of total personal income, the regional industrial and occupational structure, and the level of investor confidence within the region.

The distribution of total personal income is examined to assess the NECP's impact on equity in material wealth within the region. This indicator may underestimate the spread of income as total personal income, as defined by Statistics Canada, does not include the value of assets. The region's industrial and occupational structures are examined to assess whether the NECP contributed to diversification in the regional economy, which was one of the government's clear objectives for the mega-project. Diversification in the industrial structure implies a less specialized economy that is less vulnerable to changes in external conditions.⁵ Diversification in the regional occupational structure implies a wider range of employment opportunities for regional residents, which suggests that people may not perceive that they must move away from a region to obtain different or more rewarding work opportunities. The final indicator is the level of investor confidence within

4 Several of Savoie's indicators were not relevant to this research because of its different focus. Savoie's perspective is a national one; he is concerned about long-term trends in economic disparities among provinces in Canada that have large urban centres with relatively well-developed manufacturing and service sectors. This research is concerned with the economic development of a sub-provincial, resource-based region and the study's time frame is relatively brief. Accordingly, the indicator based on manufacturing employment as a percent of all employment was deemed inappropriate to resource-based regions, especially in short-term analyses. In addition, some of the indicators suggested by Savoie cannot be used because sub-provincial data are not available at a reasonable cost. Indicators that utilize labour productivity or migration data are too expensive to be widely used at the sub-provincial level. Even information on the abundance and quality of the resource base, measured by the value added in each resource industry, is expensive to obtain for sub-provincial regions. Also, the value added regionally may not be an adequate reflection of the quality of the resource base; resources are often not processed in the regions from which they are harvested or extracted.

5 Unpublished research by the author on the response of BC's metropolitan and resource-based regions to the recession in the early 1980s suggests that the metropolitan regional economies, which are more diversified industrially, did not decline as much, and recovered more quickly, than the resource-based regional economies which are more specialized.

the region, measured by the per capita value of commercial and industrial building permits. This provides an indication of the attractiveness of the region to business, and investors' perceptions of the region's potential for future growth and development.

The complete list of indicators chosen for this research are listed below.

- 1) Population growth rates, reflecting aggregate regional growth.
- 2) Employment growth, reflecting aggregate regional growth.
- 3) Unemployment rates, reflecting opportunities for work and the match between the demand for and supply of labour in the region.
- 4) Participation rates, reflecting the optimism within the regional population of working age regarding opportunities for work in the region.
- 5) Average per capita and household income, reflecting the average standard of living for individuals and households in the region.
- 6) The distribution of personal income, reflecting the degree of equity in material well-being in the region.
- 7) The percentage of total personal income attributable to government transfers to individuals, reflecting the ability of the regional economy to provide adequate material support for its population.
- 8) The highest level of education obtained in the population over 15 years of age, reflecting human resource development in the region.
- 9) The industrial structure of the economy, reflecting the diversity of the regional economy.
- 10) The occupational structure of the economy, representing the variety of work opportunities available in the region.
- 11) The value of commercial and industrial building permits issued per capita, reflecting the attitude of investors toward the region.

These indicators reasonably represent many of the components of regional economic development. However, they do not include all components of this process, and the relationship between the indicators and the process is not as well-developed as it might be. In using this set of indicators to examine the NECP's impact on regional economic development, it is wise to recall Perloff's advice on interpreting indicators of regional economic development.

It is the better part of wisdom to appreciate that existing conceptual and statistical tools can grasp only the crudest notion of the nature and direction of these changes. (Perloff 1963, 12).

The second task is to choose a region that would establish the 'policy-off' trends in these indicators. The initial tendency may be to use the Province as the control region. If the policy or project is designed to lessen disparities between the study region and the provincial average (which is some average of metropolitan regions and resource-based regions in BC), then the Province is the appropriate reference region. However, if the policy or project is oriented to regional economic development, and not borne out of a disparity perspective, then the reference region must be a region or set of regions that is similar to the study region and governed by similar forces. The NECP was not intended to lessen disparities but to develop the region's economy by developing its resource potential. Thus the province was not used as the control region. Another alternative is to use another resource-based region of similar size and economic structure to the study region, but the economic base of the Peace River area is quite different from any other single resource-based region in BC.⁶ However, the aggregate of BC's resource-based regions is sufficiently similar to the Peace River economy that this larger set of regions may reasonably serve as the control region.

⁶ The Peace River economy has a large wheat farming sector and also an oil and gas sector. I considered using an Albertan region as the control region but decided against it because of the different institutional environment. The Peace River area was judged to be sufficiently similar to the aggregate of BC's resource-based regions for this larger set of regions to serve as the control region.

Using the indicators developed above and published data for the study and control regions from surveys conducted by Statistics Canada, ratios are constructed that compare proportional changes in each of the indicators within the South Peace study region to proportional changes in the control region. The results of this analysis are complemented with data collected by personal interviews with regional informants in October and November 1989.⁷ Interviewees were selected according to whether they were:

- a) people with a leadership role in the communities, either through their position as elected representatives or through general acknowledgement in the community,
- b) people at key 'information-collection' centres in the community such as newspaper editors, Welcome Wagon representatives, librarians, local government employees, and Chamber of Commerce managers, and
- c) business owners or managers whose firms supplied goods or services to the coal mines or to coal mine employees and their families.

Interviewees in the first two groups were identified by examining directories of municipal governments, local newspapers, or through contacting the head offices of organizations. For the third group the snowball sampling technique was used to identify interviewees. Mine management personnel and employees or their spouses, and a small number of businesspeople in Tumbler Ridge⁸ were asked to identify the regional businesses from which they purchased goods or services. From this list, major categories of businesses were identified and one or two in each category selected for interview.

⁷ A list of people interviewed, the interview schedules, and data summaries are presented in Appendix 5A.

⁸ The Tumbler Ridge businesspeople were selected as follows. A category of potential businesses was established and the Tumbler Ridge Chamber of Commerce was asked to provide a list of local businesses within these categories. One or two firms from each category was randomly selected.

Potential interviewees were first contacted in a letter which explained the purpose of the study and provided a broad outline of the interview questions. They were then contacted by phone to arrange an appointment. A total of 67 interviews were conducted⁹ in Dawson Creek, Chetwynd, West Moberly, East Moberly, Tumbler Ridge, and Kelly Lake. In addition, residents of the unincorporated, non-Native settlements in the region were interviewed. The business interviews served a dual purpose. In addition to asking about their perceptions of the general impact of the NECP on the region's economic development and the benefits and costs to the region, owners and managers were also asked about the local-value-added (LVA) in their business, the importance of the NECP to their business, the source of any hiring done related to the NECP, and any educational or entrepreneurial impacts associated with the NECP. In interviews with community leaders or information-collectors, people were asked to identify the expected and unexpected benefits and costs of the NECP on the region and on their community. The results of these interviews provide useful insights into the perceptions of some regional residents regarding the NECP's impacts, but these results must be interpreted cautiously because the interviewees were not selected within a probability sampling framework. Consequently, their representativeness of the general population's perceptions of the NECP is unknown.¹⁰

The final component of the analysis is an analysis of the intra-regional distribution of the identified impacts. The distributional analysis focuses on:

- a) the positive and negative impacts experienced by regional residents,¹¹
- b) the positive and negative impacts received by members of Native and female regional residents, and

9 Most of the interviews were taped, and all were transcribed within two weeks of being completed. Where personal appointments were not possible, the interviews were conducted over the telephone.

10 The interview data may be biased in favour of the NECP as many of these individuals might be classified as 'growth promoters' (Hoover 1971).

11 Regional residents are defined as those who lived in the region at the time of the last Census in 1981.

- c) the positive and negative impacts received by native and non-native communities in the South Peace region.

The benefits received by regional residents are analyzed as follows. First, the distribution of positive impacts between regional residents and in-migrants is examined, using many of the indicators developed above. Specially ordered cross-tabulations of 1986 Census data are required to complete this analysis.¹² Then the number of direct, indirect and induced jobs related to the NECP that were filled by regional residents is analyzed. This analysis draws on a number of data sources including the coal mines' hiring records, interviews with personnel supervisors at the coal mines, other published data, and specially-ordered cross-tabulations of 1986 Census data. Analysis of the positive and negative impacts received by women relies on survey data from the Census and mine employment records. Analysis of the positive and negative impacts received by Natives and Native communities relies exclusively on interview data. Analysis of the positive and negative impacts for non-native communities in the South Peace employs interview and Census data.

5.3 THE NECP'S IMPACTS ON REGIONAL ECONOMIC DEVELOPMENT

Population and Employment Growth

Between 1981 and 1986, employment in the South Peace region increased from 11,040 to 12,190 (Figure 5.1), a growth rate of 2.00% per year. Population increased from 24,735 to 28,420 (Figure 5.2), equal to an annual growth rate of 2.82%. This pattern was very different from that of BC's resource-based regions over the same period, where employment declined at 1.18% per year, and population remained relative stable, growing by 0.07% per year.

¹² One potential problem with the data is that the in-migrant group included more people than just those who moved to the region to take up employment opportunities related to the NECP, but the non-NECP in-migrants could not be removed from the sample.

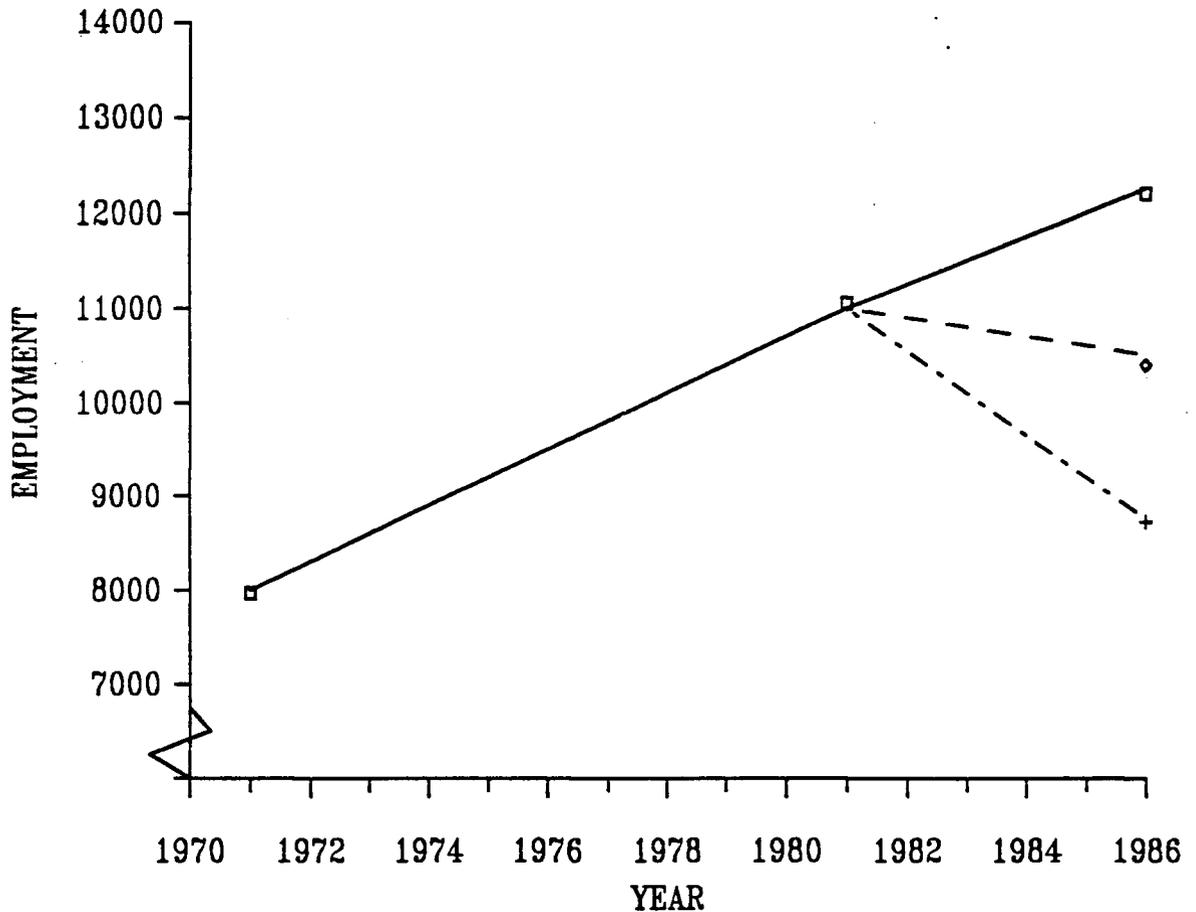
The *ex post* demo-economic impact analysis completed in Chapter 4 that employed economic base analysis suggested that 3,473 jobs in the regional economy in 1986 were related to the NECP, and that this employment impact had caused 6,330 people to move to the South Peace region. These impacts represent 28.5% and 22.3% of total regional employment and population, respectively. This suggests that the NECP was responsible for regional employment and population growth between 1981 and 1986, and that regional employment and population would have declined substantially over that time period had the NECP not proceeded. However, as argued in Chapter 4, the magnitude of the decline is difficult to estimate. Certainly, basic employment in the region would have declined by the number of mining jobs. The change in non-basic employment and population, however, could have been small if the unemployed workers and their families remained in the region. However, the *ex post* economic base analysis suggests the NECP stabilized employment and population in the South Peace and stimulated growth.

Labour Force Participation and Unemployment Rates

The labour force participation rate in the South Peace increased from 67.5% in 1981 to 70.4% in 1986. The participation rates in the South Peace were higher than in BC's resource-based regions in 1981 and 1986, and the rate went up slightly in the South Peace over the time period relative to the base case, or without-project, scenario (Figure 5.3). The higher proportion of individuals aged 15 to 64 who were in the labour force in 1986 compared to 1981 suggests that the perception of employment opportunities within the region improved over the time period.

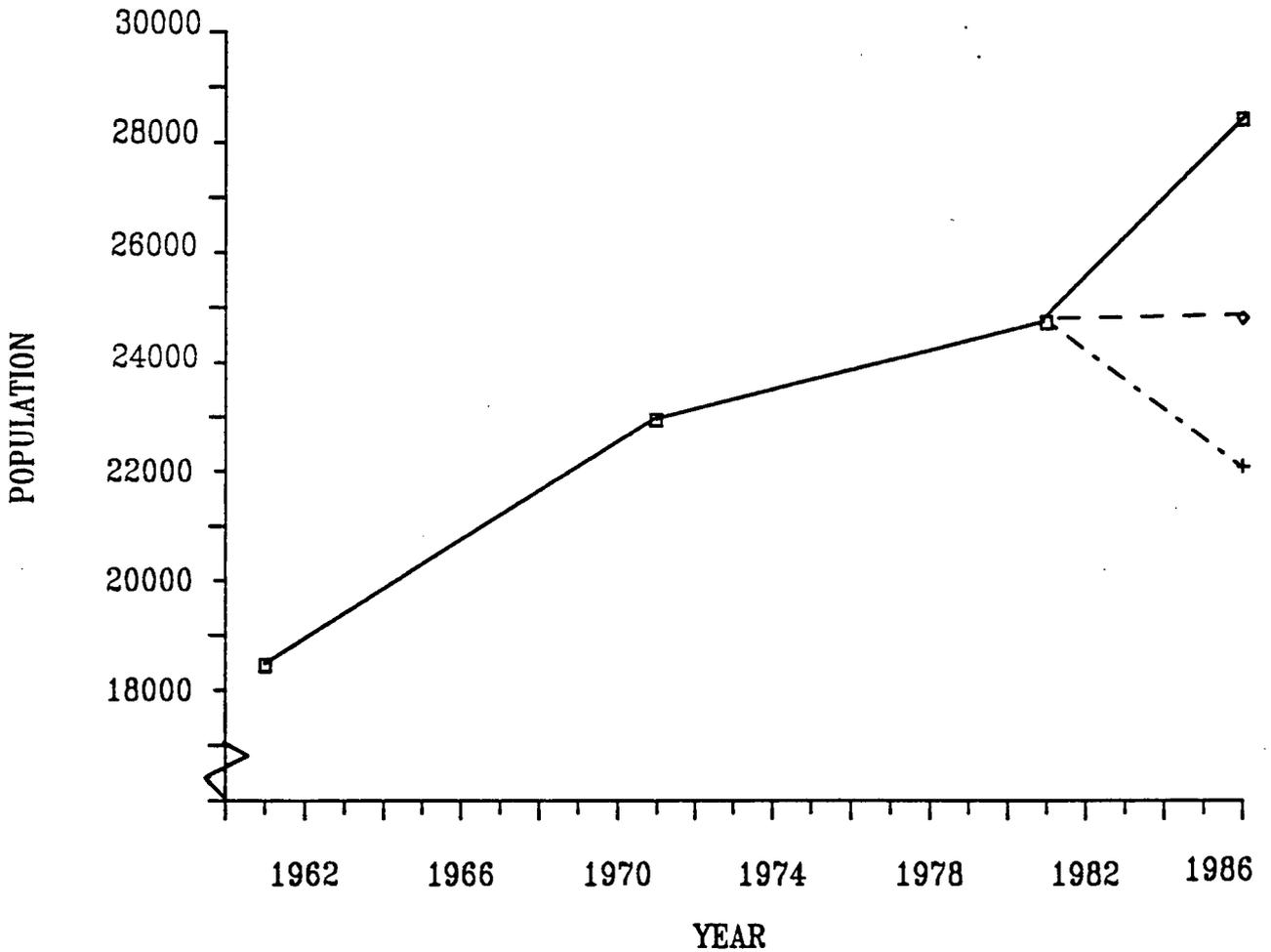
The unemployment rate in the South Peace was 8.8% in 1981, and increased to 15.9% in 1986. In both years, the South Peace had a higher unemployment rate than BC's

FIGURE 5.1
SOUTH PEACE EMPLOYMENT, 1971-1986
SHOWING ESTIMATED EFFECT OF THE NECP



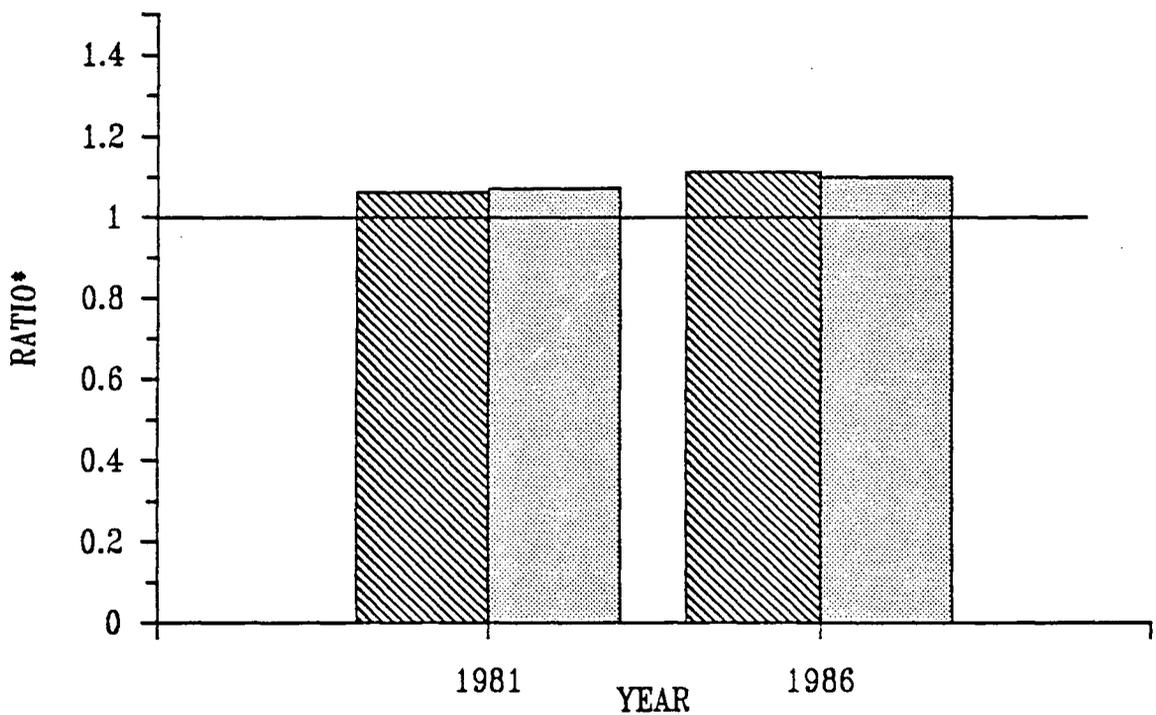
- Actual Employment. Source: Statistics Canada, Census, various years.
- - - Excluding Employment Related to the NECP, Estimated Using Demo-Economic Impact Analysis Approach
- . - Excluding Employment Related to the NECP, Estimated Using Comparative Region Approach

FIGURE 5.2
SOUTH PEACE POPULATION, 1961-1986
SHOWING ESTIMATED EFFECT OF THE NECP

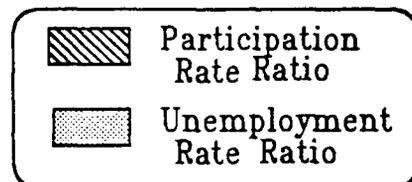


— Actual Population. Source: Statistics Canada, Census, various years.
 - - - Excluding Population Related to the NECP, Estimated Using Demo-Economic Impact Analysis Approach
 - . - Excluding Population Related to the NECP, Estimated Using Comparative Region Approach

FIGURE 5.3
RELATIVE PARTICIPATION AND UNEMPLOYMENT RATES
SOUTH PEACE AND BC'S RESOURCE-BASED REGIONS
1981, 1986



* Ratios compare the participation and unemployment rates in the study region to the rates in BC's resource-based regions. RBR rate = 1.00



Source: Statistics Canada, Census, various years.

resource-based regions (Figure 5.3), and the total number of people unemployed increased from 1,065 to 2,038.¹³ The NECP apparently did not resolve the region's unemployment problems.

The effects of regional policies may not be reflected in unemployment data (Armstrong and Taylor 1985). If existing regional industries are declining faster than new jobs are being created, unemployment will increase. Or, if new jobs are being created, net out-migration may be reduced which will increase the region's labour supply and potentially the unemployment rate. Or, the participation rate may increase in response to the new job creation and drive up unemployment.

In the case of the NECP, each of these factors may have contributed to the increase in regional unemployment between 1981 and 1986. The participation rate did increase, resulting in more people looking for work. The national economy was in a recession and commodity markets were depressed in the early 1980s. These factors could have caused a decline in the employment levels of existing regional industries. The prospect of new jobs associated with the NECP may have discouraged people from moving out of the region to find other work opportunities, and this may have been reinforced by the recession. Eighty-four percent of regional residents interviewed in this study said that expectations of local employment in coal mining were very high. This may have discouraged many people from moving away. Despite these expectations, only a small proportion (15%) of the operating jobs were obtained by regional residents. Yet, a large number of people moved to the South Peace to take coal mining jobs. The net effect increased the labour supply at a greater rate than employment grew.

¹³ Census data do not reflect hidden unemployment and underemployment, and are only collected once every five years. However, for small regions the Census provides the best estimate because of its sample size.

Average Per Capita and Household Income

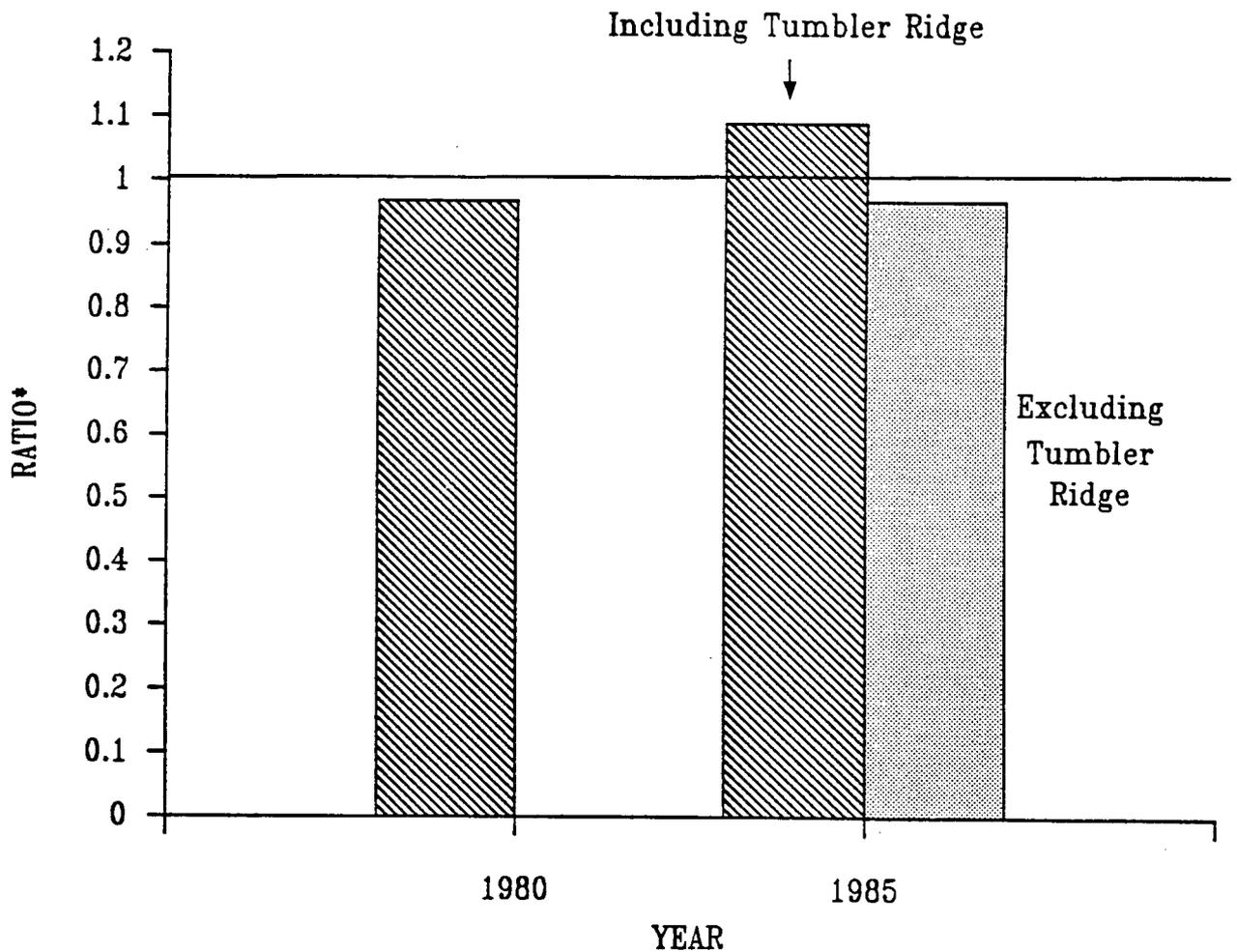
Average per capita incomes in the South Peace region increased between 1980 and 1985¹⁴ from \$17,860 to \$18,844 (1985\$C). This was significantly better than the experience of people in BC's resource-based regions, where average per capita income declined from \$18,340 to \$17,359 (1985\$C). On average, individuals in the South Peace went from a position of being slightly worse off compared to BC's resource-based regions, to being significantly better off (Figure 5.4). Had the NECP not proceeded, average per capita incomes in the region may have declined slightly, following the trend in BC's resource-based regions.

Similarly, average household income in the South Peace increased from \$33,283 in 1980 to \$33,439 in 1985 (1985\$). In comparison, households in BC's resource-based regions sustained a decline in average income from \$33,605 to \$30,858 (1985\$). On average, households in the South Peace had lower incomes than households in BC's resource-based regions in 1980, but were well above in 1985 (Figure 5.5). Again, had the NECP not proceeded, average household income in the South Peace might have declined, following the trend in BC's resource-based regions.

When individuals and households in Tumbler Ridge are removed from the calculation of regional averages, the new averages for the South Peace region do in fact closely follow the trends of BC's resource-based regions. Average per capita and household incomes in the region, without Tumbler Ridge, declined from \$17,860 to \$16,785, and from \$33,283 to \$29,846 in 1985, respectively (Figures 5.4 and 5.5). This suggests the NECP did not raise the incomes of people living outside Tumbler Ridge.

¹⁴ The income figures reported in the Census are for the previous year.

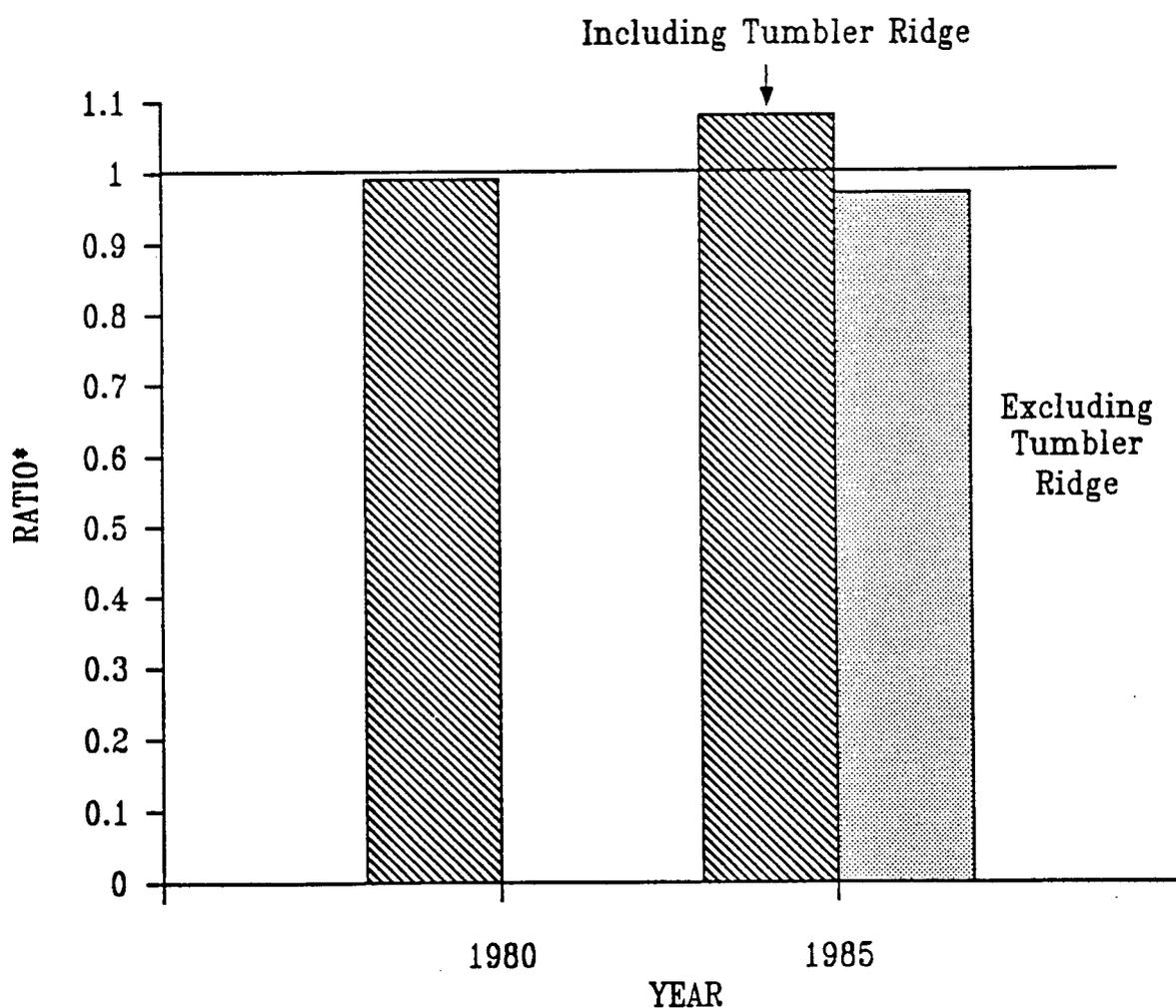
FIGURE 5.4
 RELATIVE PER CAPITA INCOMES
 SOUTH PEACE AND BC'S RESOURCE-BASED REGIONS
 1980, 1985



Source: Statistics Canada, Census, various years.

* Ratio of average per capita income in South Peace to B.C.'s resource-based regions; RBR's = 1.00

FIGURE 5.5
 RELATIVE HOUSEHOLD INCOME
 SOUTH PEACE AND B.C.'S RESOURCE-BASED REGIONS
 1980 - 1985



Source: Statistics Canada, Census, various years.

* Ratio of average household income in study region to average household income in B.C.'s resource-based regions; RBR's = 1.00

Distribution of Personal Income

To examine the NECP's impact on the distribution of income within the region, Lorenz curves were constructed using data from custom tabulations of the 1981 and 1986 Census (Figure 5.6). Unfortunately, these data were not obtained for BC's resource-based regions, and so it is not possible to employ the comparative region approach for this indicator. However, the region's curves for 1980 and 1985 can be compared to see whether any improvement in the distribution of income occurred.¹⁵

The Lorenz curves for 1980 and 1985 do not show any significant change in the distribution of personal income within the South Peace. A close examination suggests that the distribution of income may have worsened slightly. In 1985, a smaller proportion of the population received a larger proportion of the total personal income in the region compared to 1980. Paralleling this observation, the people in the lowest income brackets received proportionally less of the total personal income in 1985 than they did in 1980. These observations support the analysis that the increase in average per capita income was primarily due to the very high income levels of people in Tumbler Ridge. The average household income in Tumbler Ridge in 1985 was \$54,945.

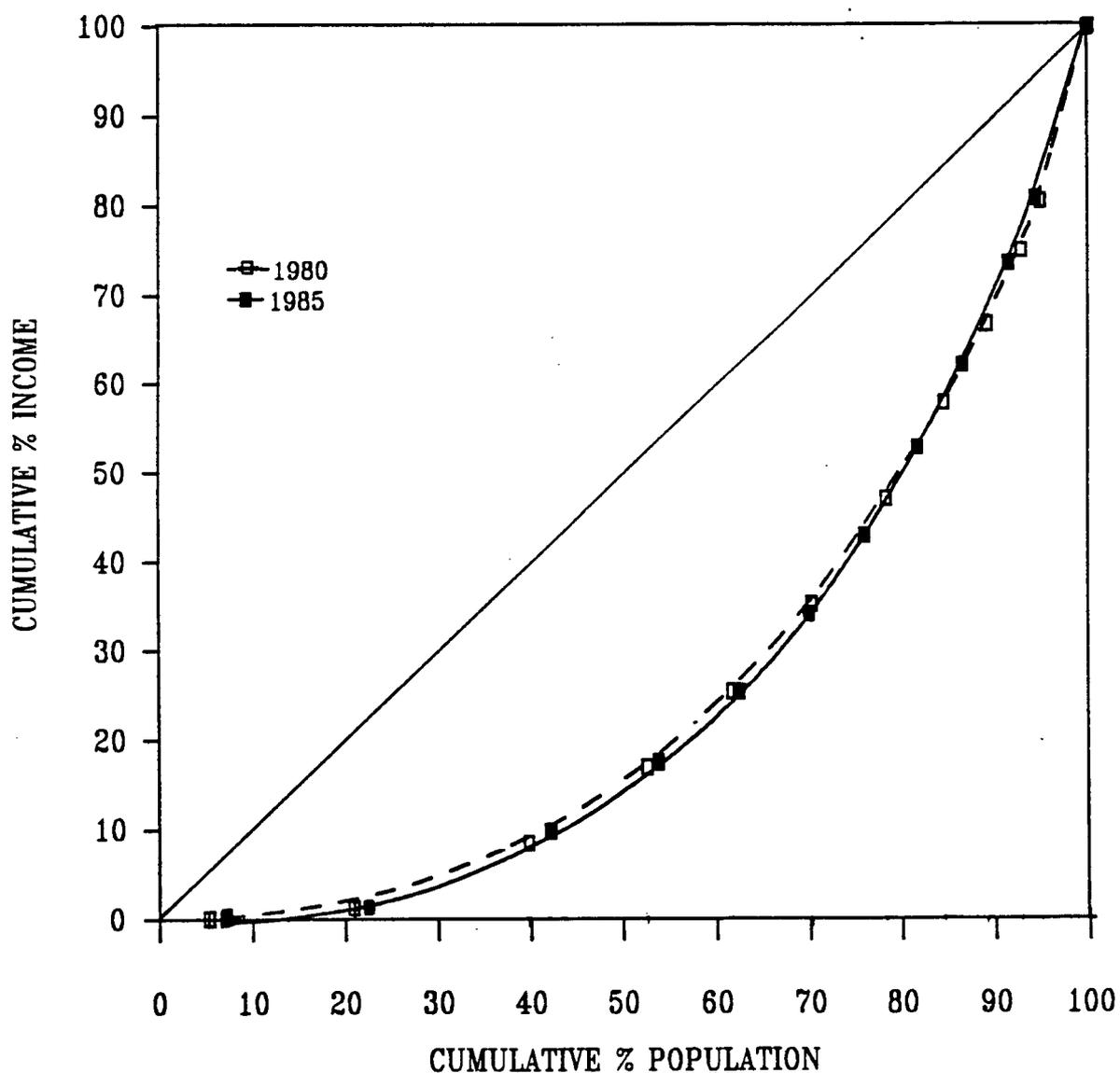
Percentage of Total Personal Income from Government Transfers

The percentage of total money income in the Peace River-Liard Regional District that was derived from government transfer payments was 8.25% in 1981; by 1986 this percentage had grown to 13.72%.¹⁶ In BC's resource-based regions a similar pattern was observed, with the percentage increasing from 10.34% in 1981 to 16.37% in 1986 (Statistics Canada

¹⁵ Improvement is defined as a more equal distribution of income; this is reflected in changes in the Lorenz curve that decrease the Gini coefficient, which is equivalent to the area between the Lorenz curve and the diagonal.

¹⁶ This information is not available on a sub-Regional District basis.

FIGURE 5.6
 DISTRIBUTION OF PERSONAL INCOME
 SOUTH PEACE REGION, 1980, 1985



Source: Statistics Canada, 1981 and 1986 Census, Custom Tabulation.

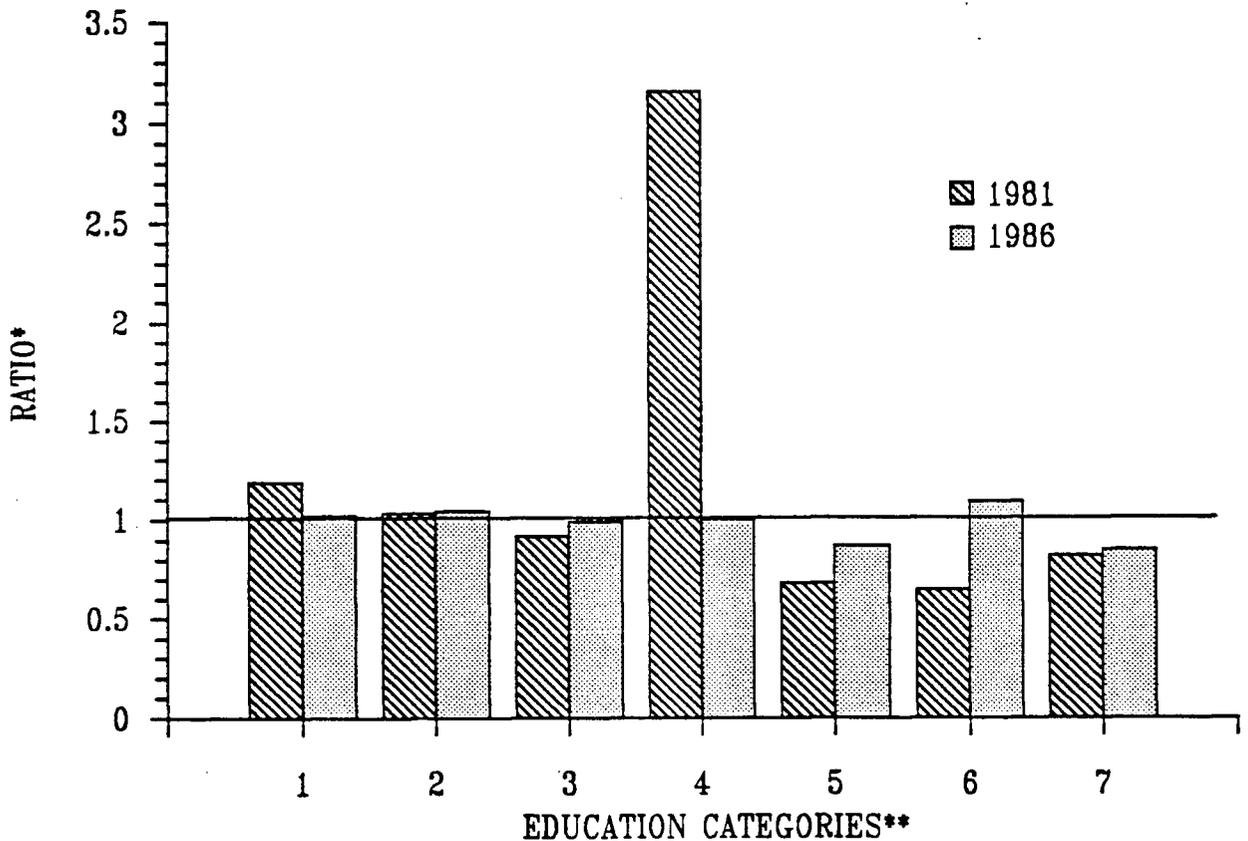
Catalogue 13-216). In both years, people in the Peace River region obtained a smaller proportion of their total money income from government transfer payments than people in BC's resource-based regions. This suggests the ability of the Peace River area to meet the material needs of its population was somewhat better than BC's resource-based regions'. However, the percentage did not decline over the time period, and the rate of increase was higher than that experienced in BC's resource-based regions.

Highest Level of Education Obtained

Between 1981 and 1986, there were marked changes in the educational levels of the South Peace population (Figure 5.7). More people had higher levels of education in 1986 than in 1981, particularly in the post-secondary education categories. Between 1981 and 1986 there was also a significant increase in the proportion of people with secondary school graduation.

Relative to BC's resource-based regions, a significantly lower proportion of the population 15 years and older in the South Peace had post-secondary education in 1981. This relative position changed dramatically after 1981 and by 1986 the South Peace had nearly the same proportion of its population with post-secondary education as BC's resource-based regions (Figure 5.7). In 1981, 24% of the South Peace population 15 years and older had post-secondary education; this grew to 36.7% by 1986. In BC's resource-based regions 34.8% of the population had post-secondary education in 1981, increasing only slightly to 38% in 1986. A large part of the change observed in the South Peace was accounted for by the 'non-university with certificate' category which was far below BC's resource-based regions in 1981, but had increased to a larger proportion by 1986. This change may have been due to the mines' training programs in safety, mining procedures, and equipment operating.

FIGURE 5.7
RELATIVE EDUCATION LEVELS,
SOUTH PEACE AND B.C.'S RESOURCE-BASED REGIONS
1981, 1986



* Ratio of proportion of population 15 years and older by education category, S. Peace and B.C.'s resource-based regions, RBR's = 1.00

** Education categories refer to highest level of schooling completed

Source: Statistics Canada, Census, various years.

Key to Education Categories:

- 1 Less than Grade 9
- 2 Grade 9 to 12, without secondary certificate
- 3 High School Graduation
- 4 Trade Certificate or Diploma
- 5 University or non-university education without certificate
- 6 Non-university education with certificate
- 7 University degree

Figure 5.7 reveals that the South Peace had a very high proportion of tradespeople in 1981, but that by 1986 the proportion had declined to where it was equivalent with BC's resource-based regions. This decline could be related to the end of hydroelectric development on the Peace River. The Peace Canyon Dam was nearing completion in the early 1980s, and many of the tradespeople could have been associated with that, and/or waiting in the region for the construction work on the NECP to begin. In either case, there was little large-scale construction activity in the South Peace in 1986 and many of the tradespeople may have left the region to work elsewhere. Or, accounting procedures at Statistics Canada may have shifted tradespeople into some of the other higher education categories. The mines could have hired many tradespeople but given them further training on mining equipment or in safety procedures which would have caused the tradespeople to shift into some of the other categories of education in the Census data.

Industrial Structure of the Economy

Between 1981 and 1986 the South Peace's economy shifted strongly towards the primary sector, and experienced a moderate relative increase in manufacturing activity. All other sectors declined relatively. The largest declines were in transportation and communication, which may reflect the phasing down of hydroelectric development on the Peace River. A detailed cross-tabulation of the Census data¹⁷ revealed that the shift towards the primary sector was due to the mining employment created by the NECP, and the slight increase in manufacturing was accounted for by increases in petroleum and coal products, metal fabricating, chemical products, and machining, all of which are strongly related to the new mining activity.

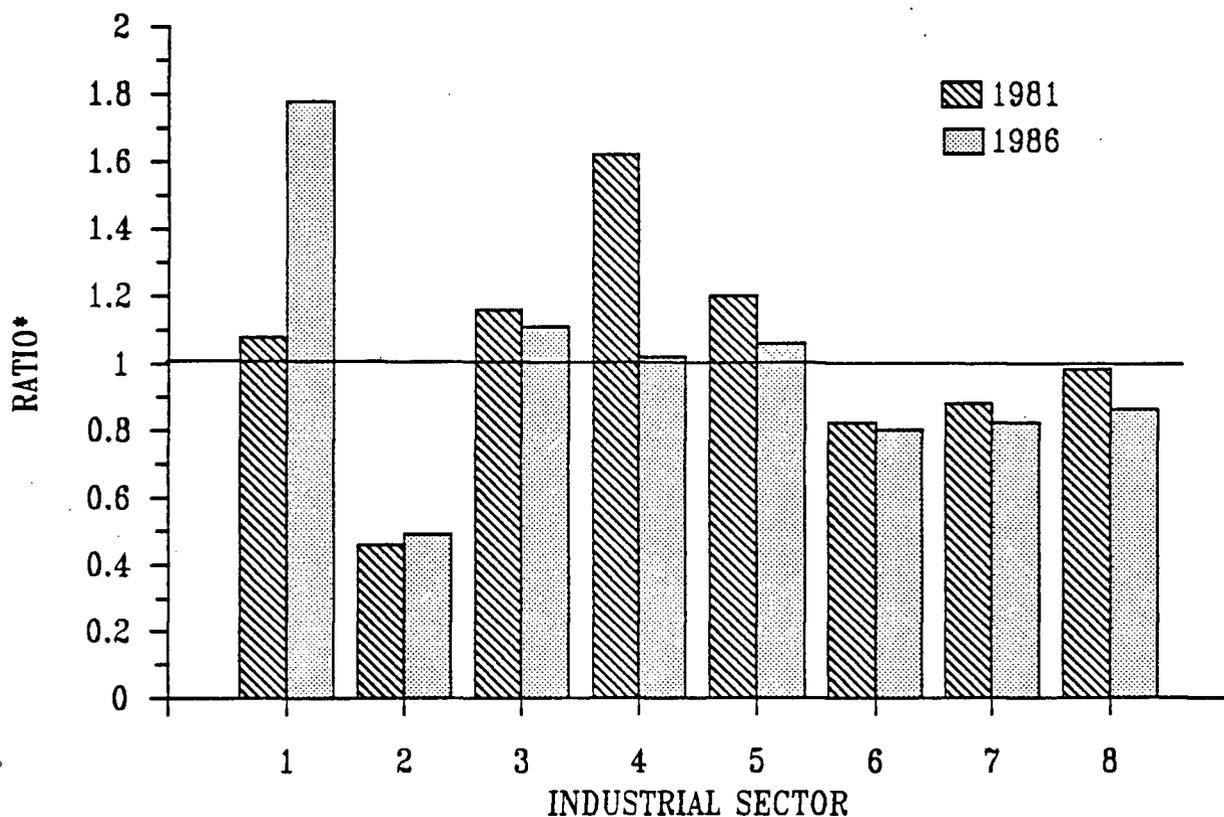
¹⁷ This cross-tabulation detailed the experienced labour force by industry, disaggregated to the 3-digit level of the Standard Industrial Code.

Relative to BC's resource-based regions, the South Peace economy in 1981 was more specialized in construction, transportation communication and utilities, trade, and primary industries (Figure 5.8). This industrial structure reflected the influence of twenty years of hydroelectric development on the Peace River and the export orientation of the resource sector, both of which create large roles for transportation and trade. Compared to BC's resource-based regions, the South Peace had a very low proportion of its labour force in manufacturing in 1981, probably because of the importance of agriculture in the region compared to the dominant position of forestry in BC's resource-based regions. Agriculture, especially grain farming, has always been an important component of the resource base in the South Peace, but there is very little associated manufacturing activity. While approximately 9% of the experienced labour force was in the agriculture industry in 1981, food and beverage processing was virtually non-existent. Most of the manufacturing activity in the South Peace in 1981 was associated with forestry, but it was not a large enough sector in the regional economy to bring the manufacturing activity to levels approaching that of BC's resource-based regions.¹⁸

In 1986, the South Peace economy was highly specialized in the primary sector due to the new mining employment. The South Peace had almost twice the proportion of its experienced labour force involved in primary industries relative to BC's resource-based regions (Figure 5.8). Construction, transportation communication and utilities, and trade industries were approximately the same size, proportionally, as in BC's resource-based regions. However, the finance insurance and real estate, government, and services industries were comparatively under-represented in the South Peace, and in fact declined,

¹⁸ The proportion of the experienced labour force in the South Peace in forestry was 2.2%, and an additional 4.75% was in wood manufacturing, totalling 6.95% in these two forest-related industries. The proportion of the experienced labour force in forest-related industries in BC's resource-based regions is probably about 15%. According to published Census data for 1981, BC's resource-based regions had between 2% and 8% of the experienced labour force in the forestry industry, and between 10% and 25% in manufacturing.

FIGURE 5.8
RELATIVE INDUSTRIAL STRUCTURE
SOUTH PEACE AND BC'S RESOURCE-BASED REGIONS
1981, 1986



* Ratio of proportion of experienced labour force by industrial sector, S. Peace to B.C.'s resource-based regions, RBR's = 1.00

Source: Statistics Canada, Census, various years

Key to Industrial Sectors:

- 1 Primary
- 2 Manufacturing
- 3 Construction
- 4 Transportation, Communication, and Utilities
- 5 Trade
- 6 Finance, Insurance and Real Estate
- 7 Government
- 8 Services

compared to the trend in BC's resource-based regions between 1981 and 1986. The proportion of the South Peace experienced labour force in manufacturing continued to be far below that of BC's resource-based regions (Figure 5.8).

The NECP diversified the primary sector in the South Peace, adding mining to the existing resource base of agriculture, forestry, hydroelectric, and oil and gas development. However, the addition of mining is a double-edged sword: while it added a new resource industry to the regional economy, mining is capital-intensive and faces volatile international markets. The potential for booms and busts to play a larger role in the regional economy may have increased because of the NECP. In addition, the magnitude of the employment created in the primary sector caused the specialization index for the South Peace to increase from 19.1 in 1981 to 21.0 in 1986.¹⁹ However, this increased specialization may not be sustained. The mines started into their operational phase in late 1983 and thus had been operating for 2.5 years when the Census was taken in June of 1986. The region's service sector may not have fully responded to the new mining employment by the time of the Census.²⁰ By 1991, the region's service sector may fully respond to the NECP's impact on primary employment, and the specialization index may decline.

A lagged regional economic response to new employment is not unusual, and is affected by a number of factors such as expectations and experience within the regional service sector. In the NECP case, two additional factors may also be influencing the lagged response to the new primary employment. First, the new town atmosphere and feelings of isolation encourage people to leave Tumbler Ridge during time off from work (Boothroyd and Knight

¹⁹ The specialization index compares a regional economy's structure to the national economic structure. Absolute proportional differences from the national structure are summed to yield the index.

²⁰ In 1981, the proportion of the experienced labour force in the services sector in the South Peace was approximately the same as in BC's resource-based regions. In 1986, the region's proportion was significantly lower than BC's resource-based regions' (Figure 5.8).

1990; Shera and Gill 1987). These feelings may have been enhanced by the widespread perception that several businesses operating in Tumbler Ridge during the early years were poorly managed and uncompetitive. Usually these trips outside Tumbler Ridge are combined shopping/pleasure outings and people travel to Dawson Creek, Chetwynd, Grande Prairie, Fort St. John, Prince George, Edmonton and Vancouver.²¹ The shift arrangement for the majority of the bargaining unit employees at the QCL mine is 4 days at work followed by 4 days off, which facilitates fairly long trips during time off from work. Grande Prairie is a favourite destination of many people living in Tumbler Ridge, not only because Alberta has no sales tax but also because the town has a large mall. Merchants in the Grande Prairie Mall may capture a significant portion of consumption spending by Tumbler Ridge residents. Second, there was a high turnover rate at the QCL mine until very recently. The temporary attitude of many people to their residence in the area may have contributed to higher-than-usual consumption leakages from the regional economy. In interviews with Tumbler Ridge residents, many people believed that most of those people who were very unhappy in the town have left and those who are there now regard it as their home. Consumption leakages from Tumbler Ridge and the South Peace region may have declined since 1986 and may continue to decline in the future as mine employees spend more time within the region.

Occupational Structure of the Economy

Between 1981 and 1986, there were some changes in the South Peace's occupational structure (Figure 5.9). A large relative increase occurred in machining and repair

²¹ A study done for the Tumbler Ridge District Municipality by Thomas Consultants Inc. in March 1986 found that an average of 17 trips per household per year were made outside the community of Tumbler Ridge. The most popular destinations were Dawson Creek, Chetwynd and Grande Prairie. The consultants estimated that 62.5% of total retail expenditures in 1985 were made outside the community of Tumbler Ridge, and that, on average, households spent \$294.00 per trip. In interviews conducted in November 1989, most Tumbler Ridge residents said they spent more money when they went to Grande Prairie than when they went to Dawson Creek or Chetwynd.

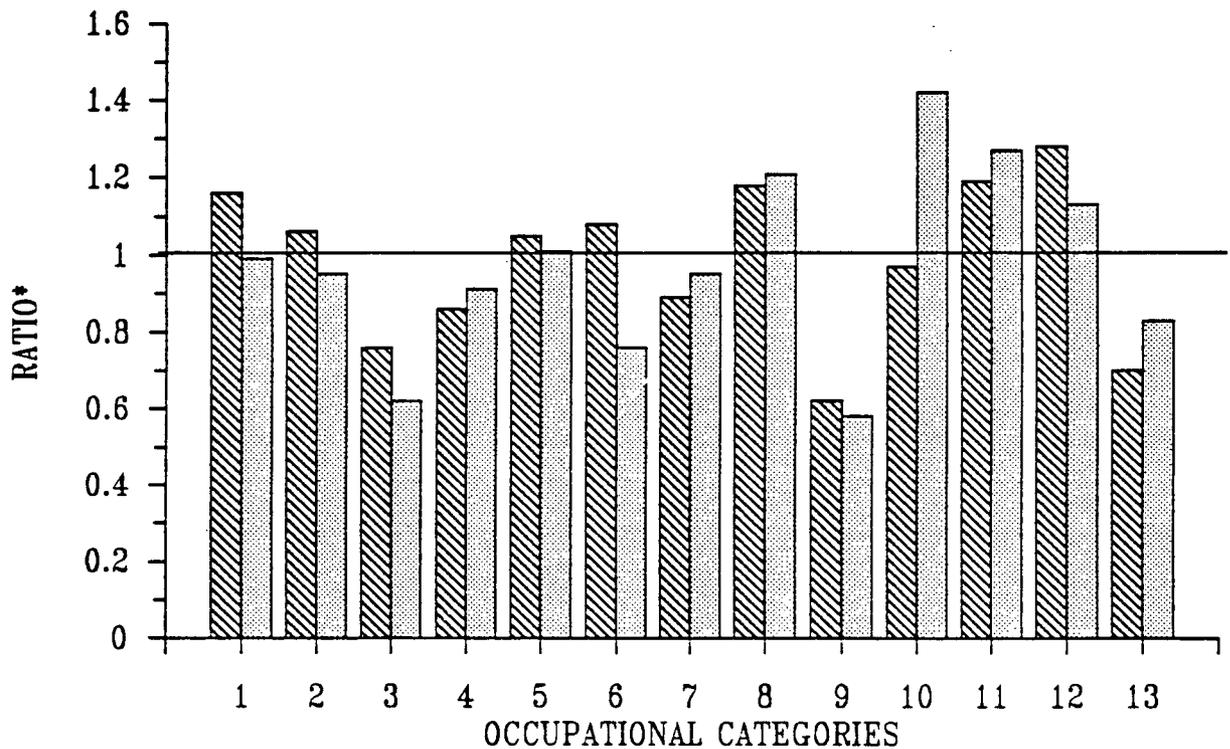
occupations. Smaller relative increases occurred in other occupations (comprised of materials handling and other craft occupations), service occupations, and in the technical-social-religious-artistic-recreational occupations. These increases are probably related to the NECP. Occupations that experienced relative declines were in the managerial, teaching, medical, sales, processing and transportation categories. The occupational changes in the South Peace may be characterized as a shift from 'white-collar' to 'blue-collar' occupations.²² In 1986 there were relatively fewer opportunities in white-collar occupations for regional residents than there were in 1981, and relatively more opportunities in blue-collar occupations. However, like the changes in the regional industrial structure, lags could be affecting the occupational structure, particularly in sales and managerial occupations.

Per Capita Value of Commercial and Industrial Building Permits

In 1981, the value of commercial and industrial building permits issued in the South Peace was \$333.74 per capita; in BC's resource-based regions it was \$339.18 per capita. In 1986 the per capita value in the South Peace increased to \$354.71, but the per capita value in BC's resource-based regions dropped dramatically to \$111.67 (Figure 5.10). This suggests that investors were much more optimistic about the future of the South Peace region in 1986 than other resource-based regions in BC.

²² For this discussion, white-collar occupations are defined as categories 1 through 6, and blue-collar occupations are defined as categories 7 through 13. The key to occupation categories is in Figure 5.9.

FIGURE 5.9
RELATIVE OCCUPATIONAL STRUCTURE,
SOUTH PEACE AND BC'S RESOURCE-BASED REGIONS
1981, 1986



 1981
 1986

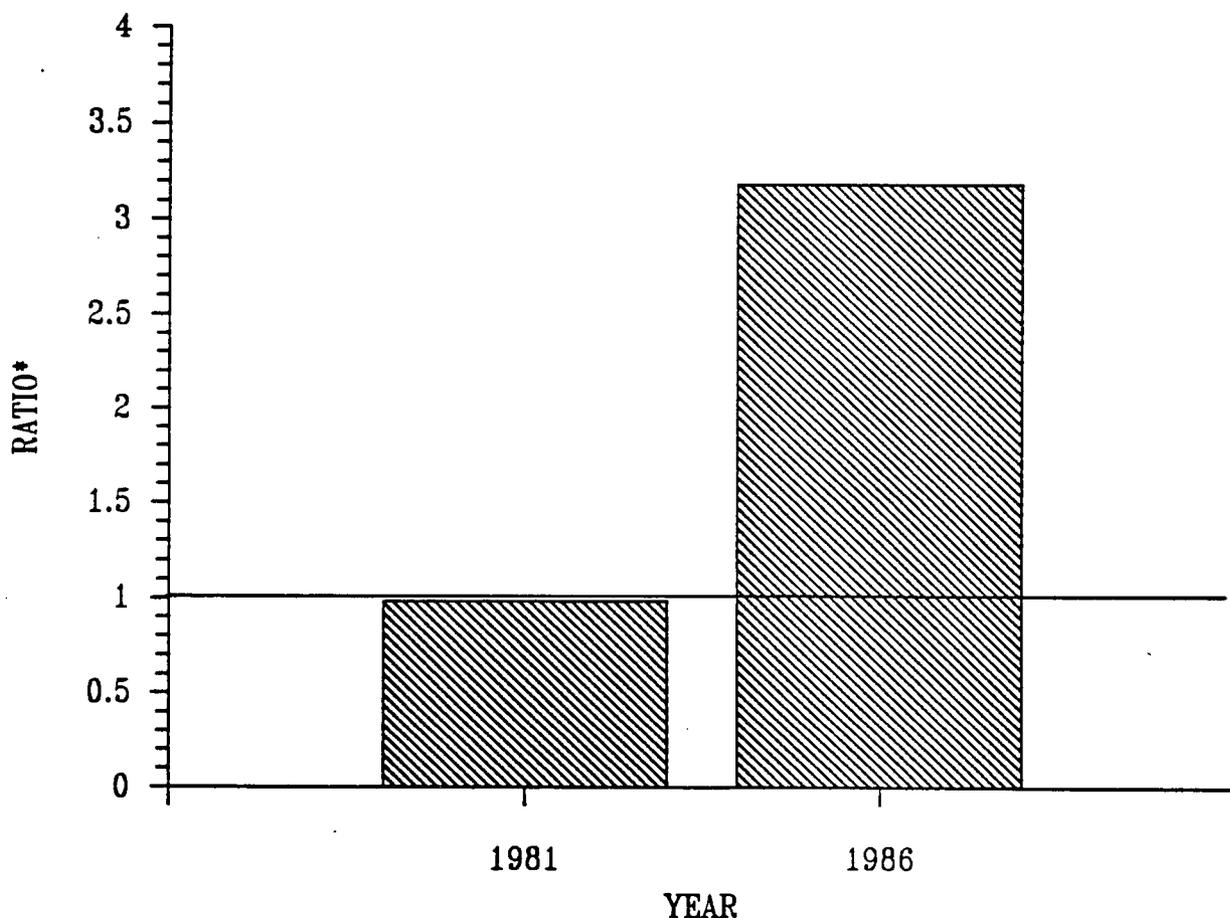
* Ratio of proportion of experienced labour force by occupational category; S. Peace to B.C.'s resource-based regions, RBR's = 1.00

Source: Statistics Canada, Census, various years.

Key to Occupations:

- 1 Managerial & Related
- 2 Teaching & Related
- 3 Medical, Health & Related
- 4 Technical, Social, Artistic
Religious & Related
- 5 Clerical & Related
- 6 Sales
- 7 Service
- 8 Primary
- 9 Processing
- 10 Machining, Fabricating
& Repair
- 11 Construction
- 12 Transportation
- 13 Other

FIGURE 5.10
RELATIVE PER CAPITA VALUE OF
COMMERCIAL AND INDUSTRIAL BUILDING PERMITS,
SOUTH PEACE AND BC'S RESOURCE-BASED REGIONS
1981, 1986



* Ratio of value of building permits issued per capita in South Peace compared to BC's resource-based regions; resource-based regions = 1.00

Source: Statistics Canada, Building Permits, various years.

Selected Regional Residents' Perceptions of the NECP's Impacts

Selected regional residents were asked to identify the benefits and costs they believed the NECP had brought to their region.²³ Fifty-five percent of those interviewed said that local people had only gained a small number of the mining jobs available, and 65% perceived the indirect and induced jobs related to the NECP to be small and concentrated in a few businesses. Thirty-three percent believed the mega-project had positive impacts on young people in the region, primarily because it increased the range and number of high-paying and skilled employment opportunities. Thirty percent said some regional infrastructure had improved because of the NECP, particularly road networks which were believed to have broad and positive economic impacts. Twenty-three percent said the NECP had produced an improvement in regional entrepreneurial talents especially in the industrial supply sectors, and 23% believed the NECP had raised the region's profile with potential outside investors. Only 16% of those interviewed believed the NECP had produced any training benefits for regional residents. Finally, 47% of those interviewed believed the NECP had stabilized the South Peace economy during the recession.

On the other hand, 44% of those interviewed believed the NECP had resulted in financial costs for regional residents because of higher taxes. Those interviewed related the tax increases to the number and high quality of institutional facilities built in Tumbler Ridge, particularly the schools. Forty-two percent said there had been inflationary impacts associated with the NECP, including rising land prices and housing costs, and 33% said there had been a bust in the region once Tumbler Ridge was completed and mine employees moved to the new town from the region's other communities. Thirty percent of those interviewed said the mega-project has had negative environmental or social impacts, although these were considered to be well within the region's previous experience with

²³ This discussion excludes the interview results from Tumbler Ridge. Thus the total number of interviews conducted was 43. See Appendix 5A for a data summary.

large projects, and 30% said the NECP had no impact on regional unemployment. Finally, 84% of those interviewed said that the expectations of regional residents regarding the NECP's positive economic impacts had not been met, resulting in a high level of disappointment.²⁴

Summary

This analysis suggests that the NECP generated regional growth and stabilized the region during the recession, but did not achieve this without some negative effects. Population and employment increased, average per capita and household incomes improved dramatically, educational levels in the population 15 years and older increased, and the value of commercial and industrial building permits per capita increased. However, the NECP apparently did not resolve the region's unemployment situation. The distribution of income did not improve during the time period, and the proportion of total money income in the region that was obtained from government transfer payments increased by a substantial amount, and at a rate higher than that experienced in BC's resource-based regions. The regional economy's industrial structure was more specialized in 1986 than in 1981, which could make it more susceptible to changes in external conditions. This analysis was consistent with the perceptions of selected regional residents. Eighty-four percent believed the regional benefits from the project had been far less than expected (or possible), and that in-migrants had benefitted most from the NECP. The distributional effects of the NECP's positive and negative impacts are analyzed in the next section.

²⁴ The regional residents attributed the lower economic impacts to the small number of direct jobs obtained by regional residents, and to the decision to build a new town.

5.4 THE DISTRIBUTIONAL EFFECT OF THE NECP'S IMPACTS ON REGIONAL ECONOMIC DEVELOPMENT

Regional Residents

In a survey of regional residents completed for the Manpower Sub-Committee, 79% of the 1,200 people interviewed thought the NECP would have a beneficial or neutral effect on life in the northeast (Cornerstone 1977). The beneficial effects were perceived to be the jobs created by the mega-project and 66% of those surveyed expressed some interest, and more than 20% expressed great interest in coal mining employment. Ninety percent of those who expressed an interest said they were willing to take training at the mine site, 78% said they would take training away from home for a couple of weeks, and 54% said they would be willing to be away for more than a month to take training. In this section, the NECP's impact on regional residents in 1986 is examined.

The level of in-migration during the 1981 - 1986 period was higher than during previous inter-Census period. In 1986 33% of the region's population had moved there within the past 5 years, compared to 29% in 1981 and 26% in 1976.²⁵ In 1986, the in-migrant group had a more youthful age structure than regional residents (Figure 5.11), with a large proportion of individuals in the 25 - 34 year age group. This did not affect the regional population's overall age structure significantly. In 1981, 66% of the regional population was less than 35 years old, and in 1986 64% were less than 35 years old. The household structure of regional residents and in-migrants was similar; the regional resident group had a higher proportion of households in the single parent and husband & wife with children categories (Figure 5.12). Interestingly, the regional resident and in-migrant populations contained the same proportion of single person households, suggesting

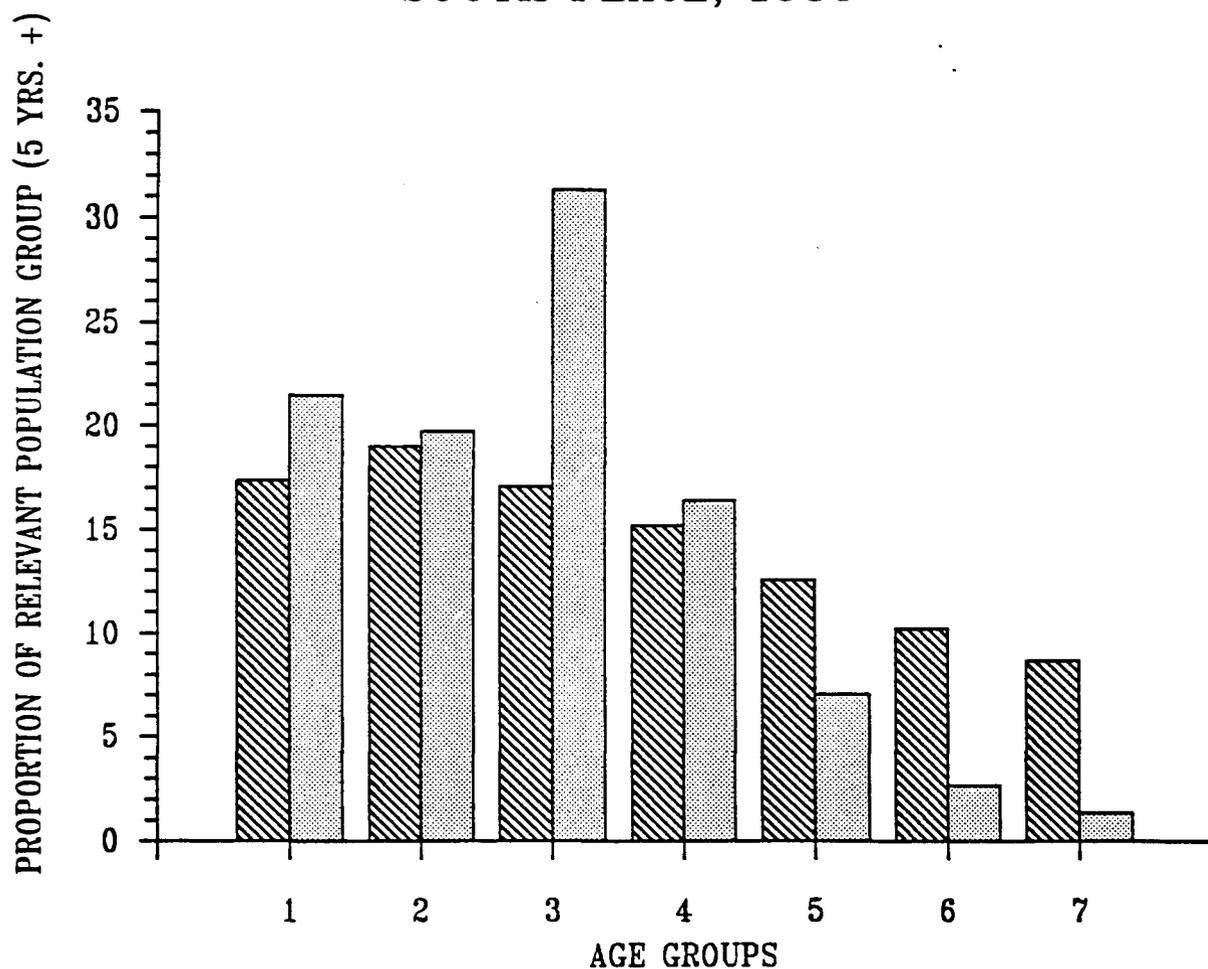
²⁵ The 1976 data are for the Peace River-Liard Regional District. Data for the South Peace region in that year were not available.

that the mega-project had not attracted an extraordinary number of single people to the region.

In 1986 in-migrants had a labour force participation rate of 74.1%, compared to 68.5% for regional residents (Figure 5.13). As economic opportunities are an important determinant of migration decisions, a higher participation rate among in-migrants is not surprising. A curious finding however, was that the unemployment rate of in-migrants and regional residents was almost equal in 1986, 15.8% and 16.1% respectively (Figure 5.13). Given the economic motivations that influence migration, in-migrants could have been expected to have a significantly lower unemployment rate than regional residents.

The similar unemployment rates between regional residents and in-migrants in 1986 may be related to the NECP's characteristics, particularly the creation of a new town and the early dominance of males in mining employment. Most of the in-migrant households were husband and wife households either with or without children. Many of the female spouses may have wanted to work but may have been unable to find employment, especially if the family residence was in Tumbler Ridge. According to the 1986 Census, the unemployment rate for men in Tumbler Ridge was 3.5%, and 24.7% for women. There were 180 unemployed women in Tumbler Ridge; most of these women were in-migrants, and their unemployment represented 21% of the total unemployment among in-migrants in 1986. If approximately half of the unemployment among women in Tumbler Ridge is removed, the unemployment rate for all in-migrants in 1986 declines to approximately 14%, nearly 2% less than the unemployment rate for regional residents. This unemployment rate is still high, but may be related to the recession's impact on the economies of all BC's resource-based regions.

FIGURE 5.11
AGE STRUCTURE OF
REGIONAL RESIDENTS AND IN-MIGRANTS:
SOUTH PEACE, 1986



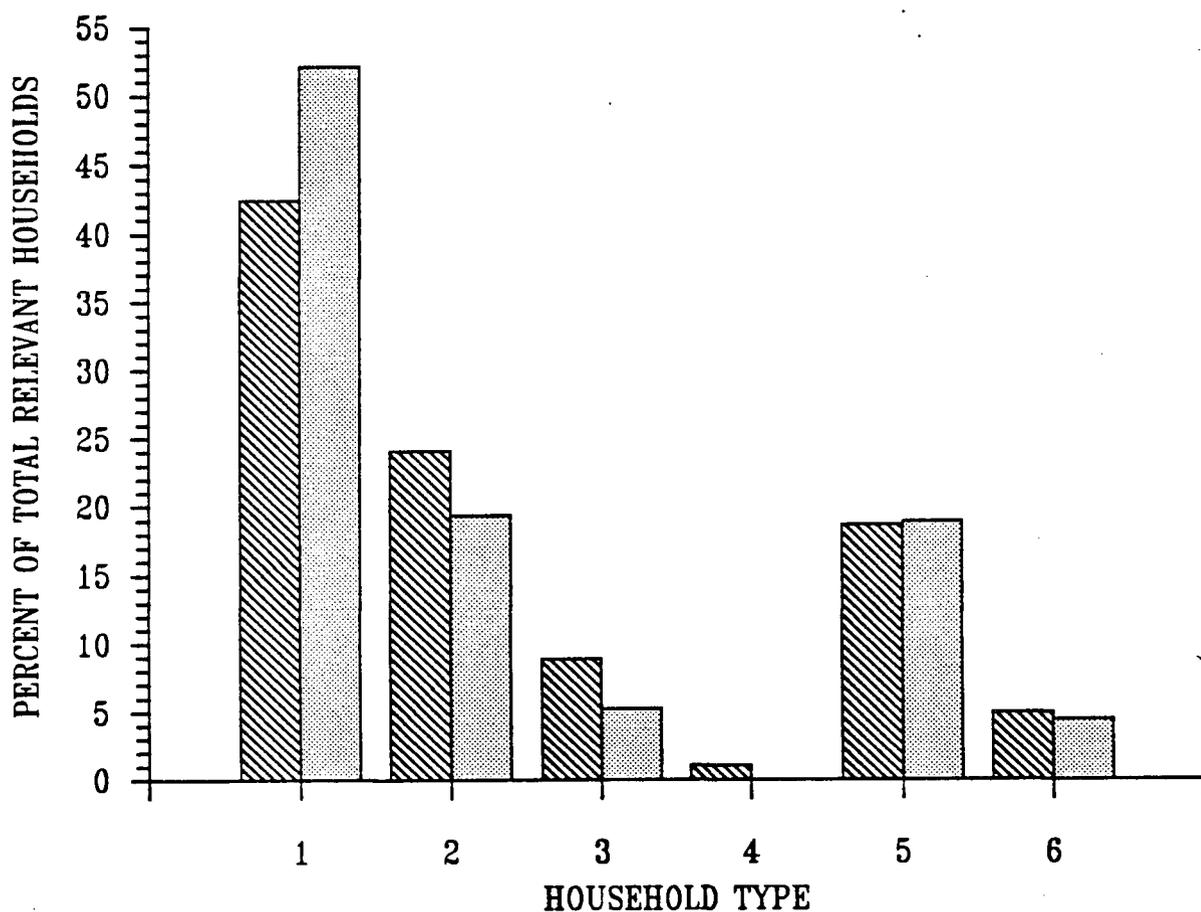
▨ REGIONAL RESIDENTS
▤ IN-MIGRANTS

Key to Age Groups:

- 1 5-14 years
- 2 15-24 years
- 3 25-34 years
- 4 35-44 years
- 5 45-54 years
- 6 55-64 years
- 7 65+

Source: Statistics Canada, Custom Tabulation, 1986 Census.

FIGURE 5.12
HOUSEHOLD STRUCTURE OF
REGIONAL RESIDENTS AND IN-MIGRANTS
SOUTH PEACE, 1986



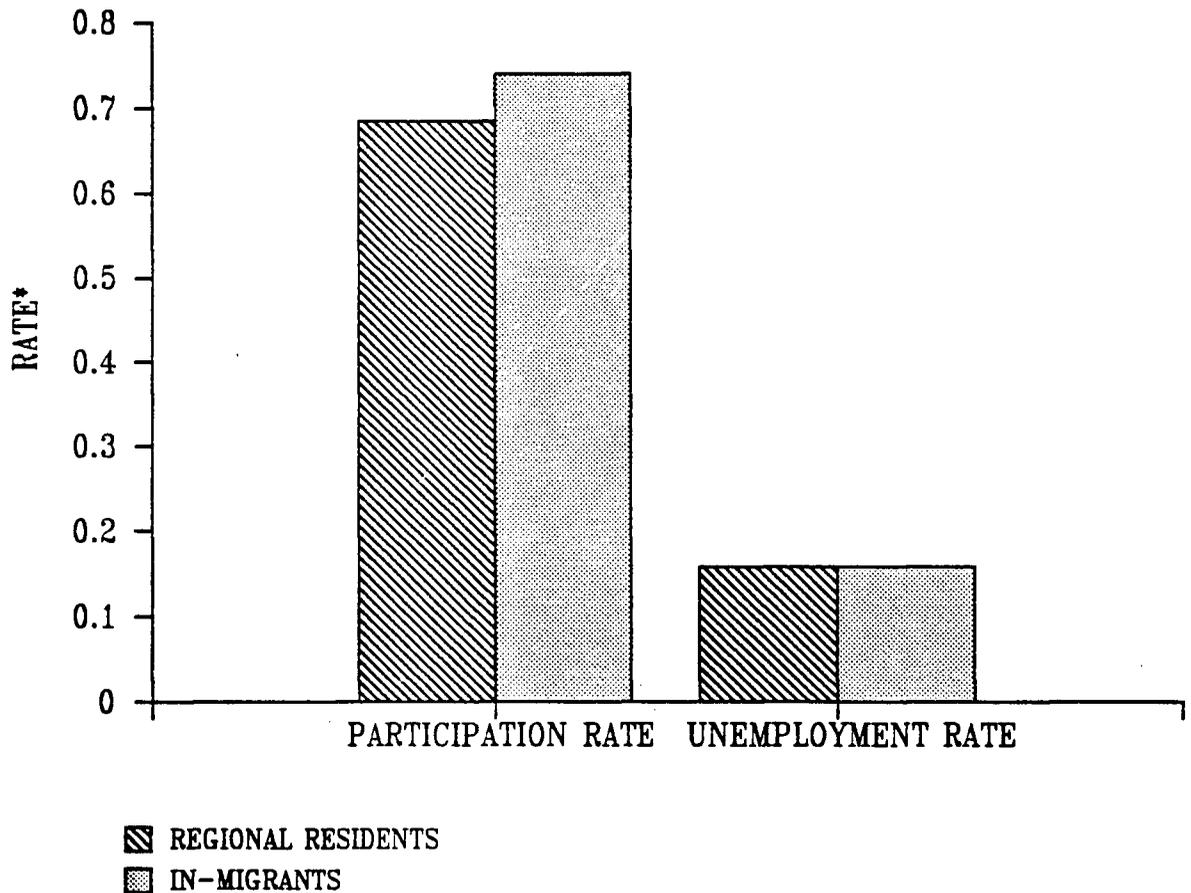
▨ REGIONAL RESIDENTS
 ▩ IN-MIGRANTS

Source: Statistics Canada, Custom
 Tabulation, 1986 Census.

Key to Household Types

- 1 Husband & Wife, no children
- 2 Husband & Wife with children
- 3 Single Parent
- 4 Multi-Family
- 5 Single Person
- 6 2+ Non-Family People

FIGURE 5.13
PARTICIPATION AND UNEMPLOYMENT RATES OF
REGIONAL RESIDENTS AND IN-MIGRANTS:
SOUTH PEACE, 1986



* Rates are for Relevant Working Age Populations or Labour Forces

Source: Statistics Canada, Custom Tabulation, 1986 Census.

In-migrants were better off financially than regional residents in 1986. A larger proportion of the in-migrants was in upper income categories compared to the regional resident population (Figure 5.14).²⁶ In-migrant households were also financially better-off than regional resident households in 1986 (Figure 5.15).

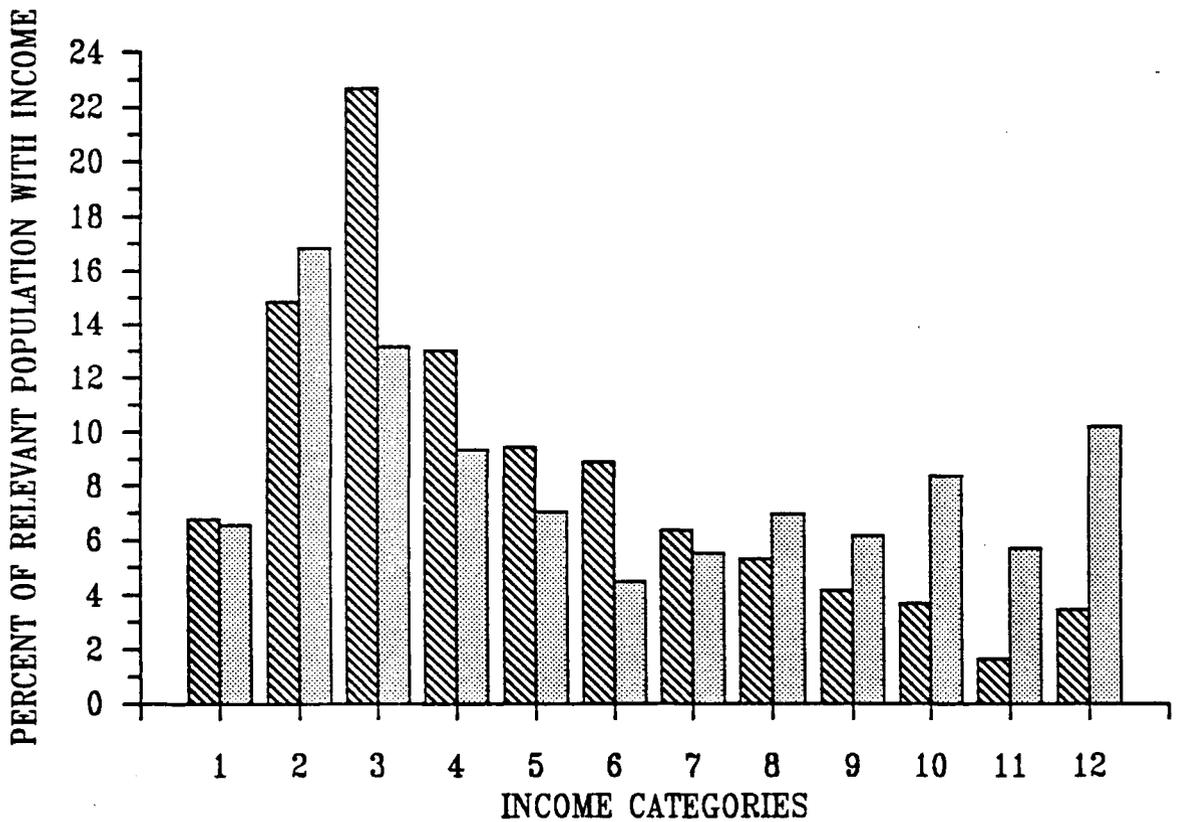
The educational attainment of in-migrants was also higher than regional residents in 1986. Compared to regional residents, there were proportionally fewer in-migrants with less than Grade 9 education and a much larger proportion with post-secondary education, particularly in the non-university education with certificate category (Figure 5.16).

The Census data suggest that in-migrants were primarily associated with the mining, trade, and services industries, while the regional resident group had the largest proportion of its experienced labour force in the trade and service industries (Figure 5.17). Relative to the regional resident group, the in-migrant group had a much higher proportion of its experienced labour force in the mining industry and slightly more in finance insurance and real estate, but a smaller proportion in all other industries. The shift towards the primary sector observed in the aggregate analysis was dominated by the in-migrant group.

The Census data suggest that the occupations of in-migrants were varied and not dramatically different from those of regional residents in 1986 (Figure 5.18). The in-migrant group had a larger proportion of its experienced labour force in machining, fabricating and repair, service, and social-technical-religious-artistic-recreational occupations, and a slightly larger proportion in processing, teaching, and health-related occupations. These occupations are the ones that exhibited large shifts at the regional

²⁶ Figure 5.14 also indicates there was a large proportion of in-migrants who had relatively low per capita incomes in 1986. This was likely due to universal government transfer programs, such as family allowance and unemployment insurance, and the reporting of this income in personal income statistics. Information on household incomes (Figure 5.15) suggests that this is in fact the case, as a much lower proportion of in-migrant households was in lower income categories than resident households.

FIGURE 5.14
PERSONAL INCOME DISTRIBUTION IN
REGIONAL RESIDENT AND IN-MIGRANTS POPULATIONS:
SOUTH PEACE, 1986



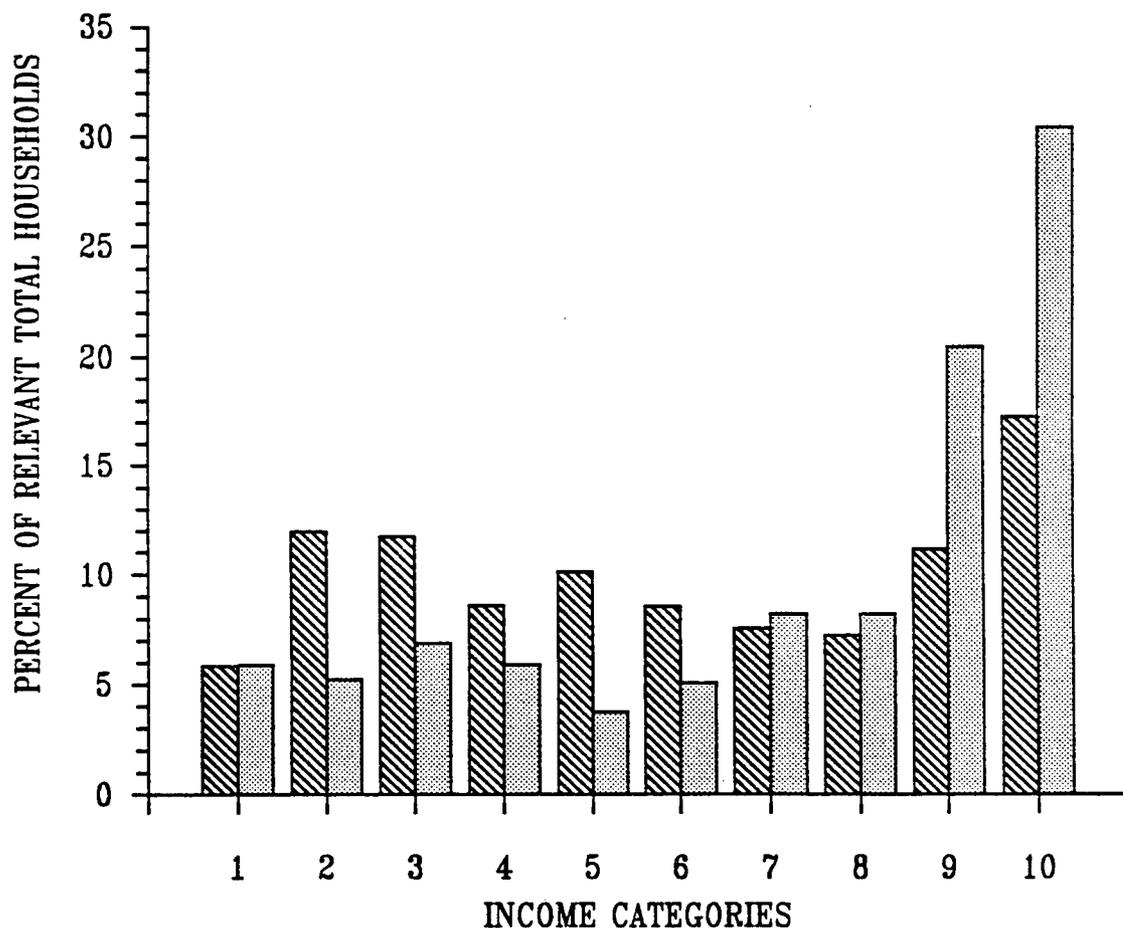
 REGIONAL RESIDENTS
 IN-MIGRANTS

Source: Statistics Canada, Custom
 Tabulation, 1986 Census

Key to Income Categories

1	<\$1000	7	\$25000-\$29999
2	\$1000-\$4999	8	\$30000-\$34999
3	\$5000-\$9999	9	\$35000-\$39999
4	\$10000-\$14999	10	\$40000-\$44999
5	\$15000-\$19999	11	\$45000-\$49999
6	\$20000-\$24999	12	\$50000+

FIGURE 5.15
HOUSEHOLD INCOME DISTRIBUTION OF
REGIONAL RESIDENT AND IN-MIGRANT POPULATIONS:
SOUTH PEACE, 1986



▨ REGIONAL RESIDENTS

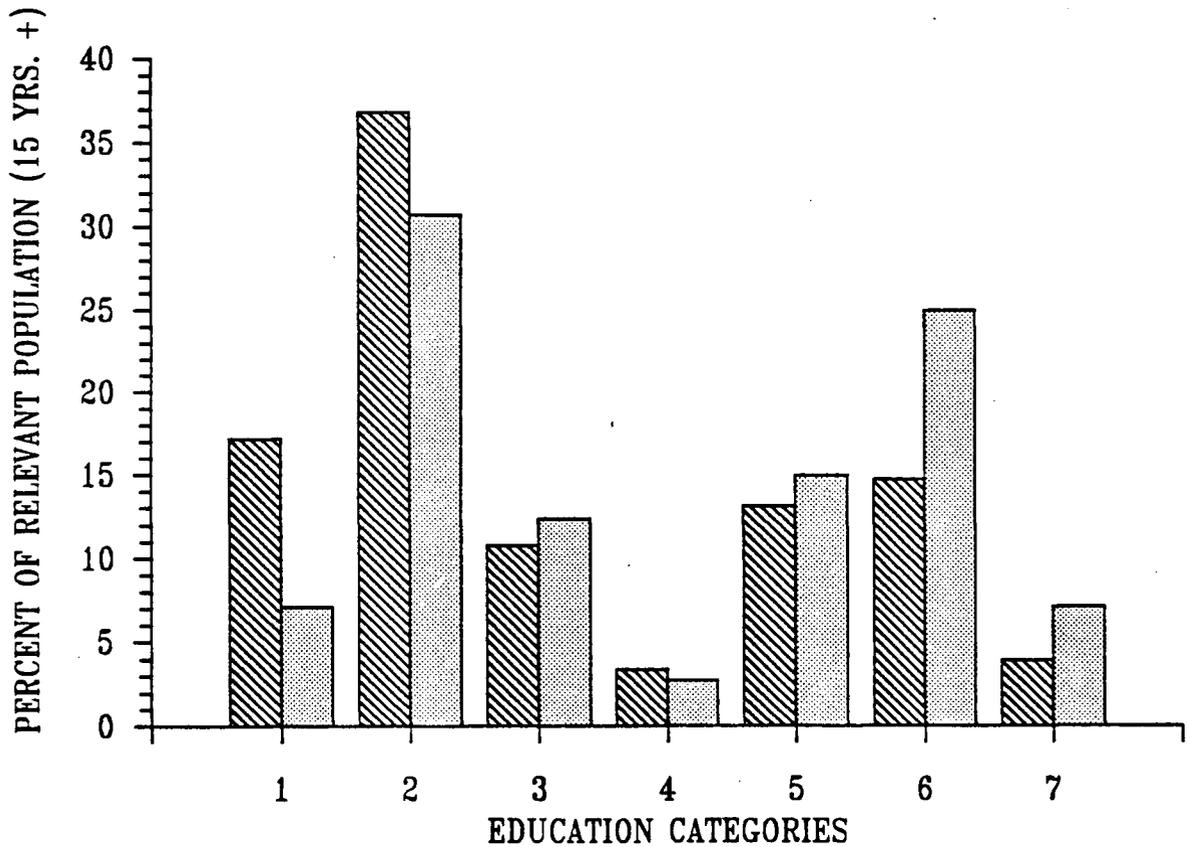
▤ IN-MIGRANTS

Source: Statistics Canada, Custom
 Tabulation, 1986 Census

Key to Income Categories

1	<\$5000	6	\$25000-\$29999
2	\$5000-\$9999	7	\$30000-\$34999
3	\$10000-\$14999	8	\$35000-\$39999
4	\$15000-\$19999	9	\$40000-\$49999
5	\$20000-\$24999	10	\$50000+

FIGURE 5.16
HIGHEST LEVEL OF SCHOOLING OBTAINED IN
REGIONAL RESIDENT AND IN-MIGRANT POPULATIONS:
SOUTH PEACE, 1986



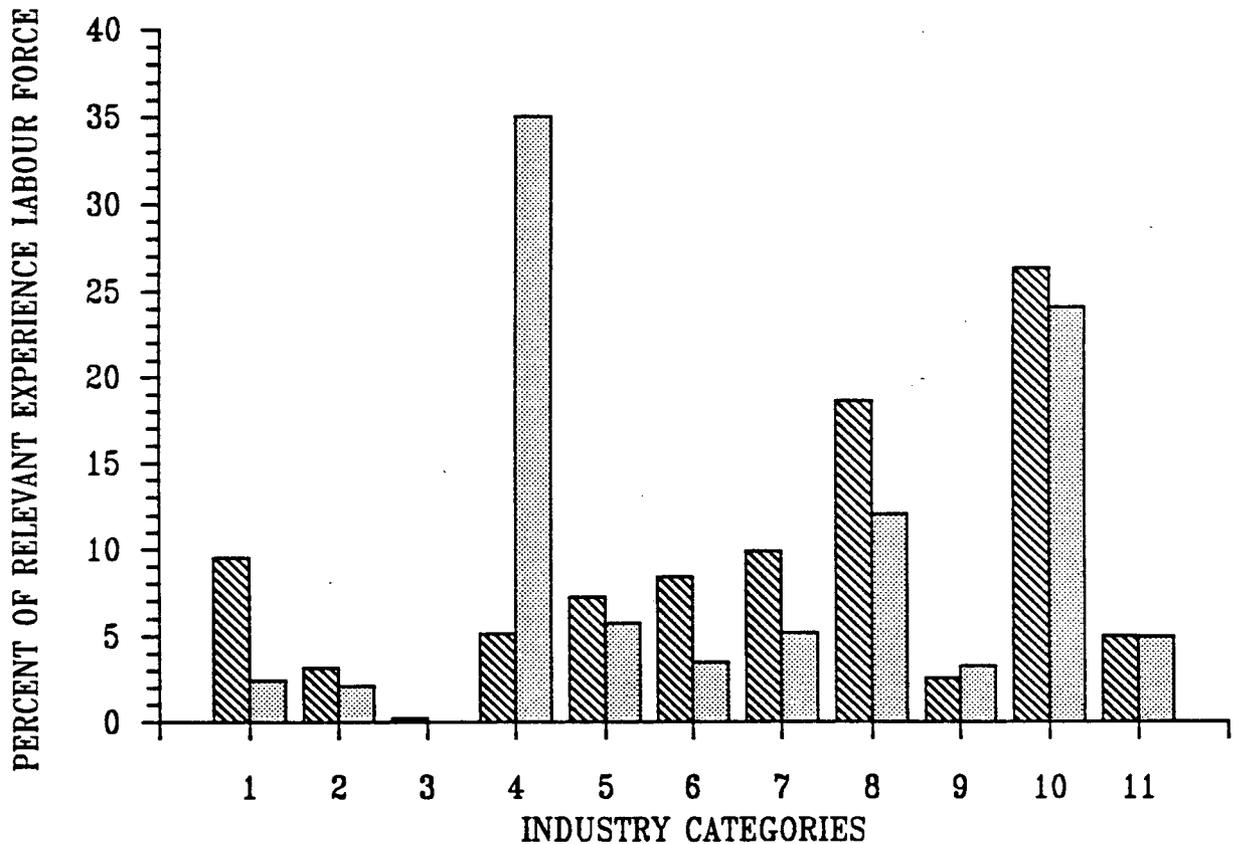
 REGIONAL RESIDENTS
 IN-MIGRANTS

Source: Statistics Canada,
 Custom Tabulation,
 1986 Census.

Key to Education Categories

- 1 Less than Grade 9
- 2 Grade 9 to 12, no secondary certificate
- 3 Secondary School graduation
- 4 Trade certificate or diploma
- 5 University or non-university education without certificate
- 6 Non-university education with certificate
- 7 University degree

FIGURE 5.17
DISTRIBUTION OF EXPERIENCED LABOUR FORCE
BY INDUSTRY IN THE REGIONAL RESIDENT AND
IN-MIGRANT POPULATIONS: SOUTH PEACE, 1986

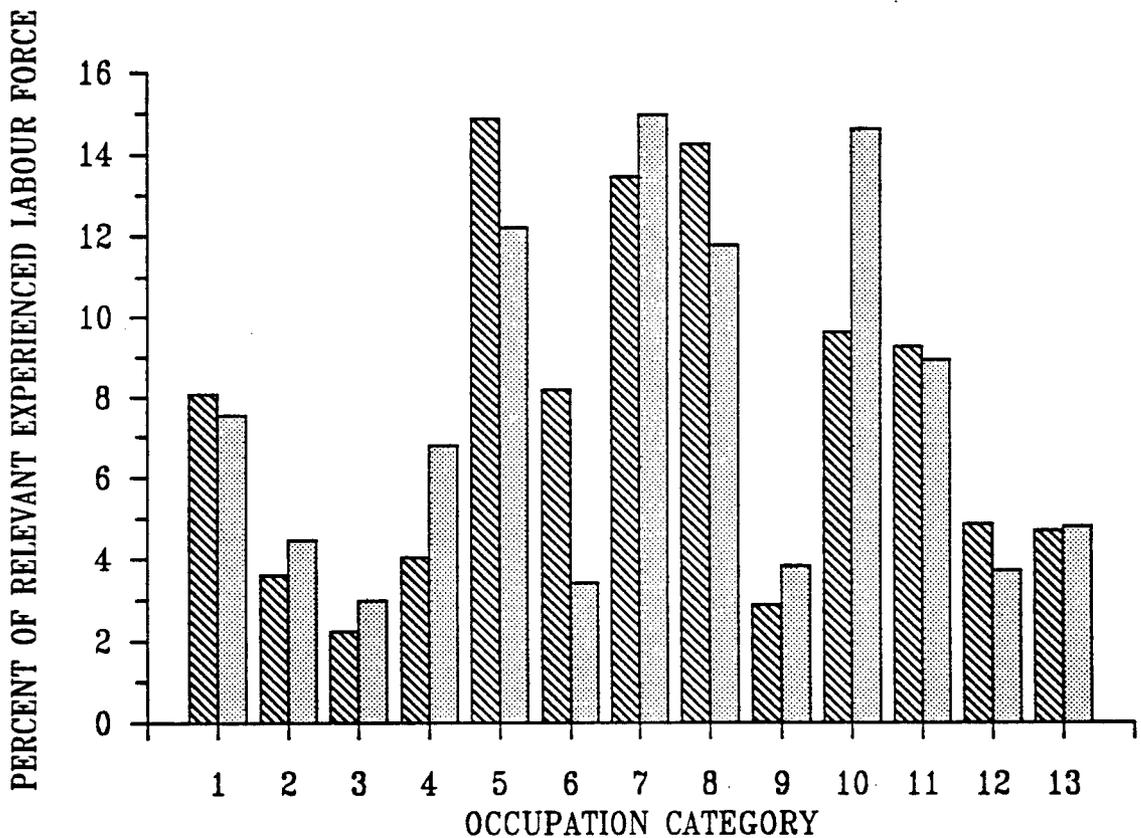


▨ REGIONAL RESIDENTS
 ▩ IN-MIGRANTS

Source: Statistics Canada, Custom
 Tabulation, 1986 Census

1 Agriculture	7 Transportation & Communication & Utilities
2 Forestry	8 Trade
3 Fishing/Trapping	9 Finance, Insurance & Real Estate
4 Mining	10 Services
5 Manufacturing	11 Government
6 Construction	

FIGURE 5.18
DISTRIBUTION OF EXPERIENCED LABOUR FORCE
BY OCCUPATION IN THE REGIONAL RESIDENT AND
IN-MIGRANT POPULATIONS: SOUTH PEACE, 1986



▨ REGIONAL RESIDENTS

▤ IN-MIGRANTS

Source: Statistics Canada,
 Custom Tabulation,
 1986 Census

Key to Occupation Categories

- | | |
|--|---|
| 1 Managerial, Administrative & Related | 8 Primary |
| 2 Teaching and Related | 9 Processing |
| 3 Medical, Health & Related | 10 Machining, Fabricating and Repair |
| 4 Technical, Social, Religious Artistic, Recreational & Rel. | 11 Construction |
| 5 Clerical and Related | 12 Transportation and Equipment Operating |
| 6 Sales | 13 Other |
| 7 Service | |

level, and the large proportion of in-migrants in these categories suggests that the occupational shifts did not create many opportunities for regional residents.

To this point, the distributional analysis suggests that the in-migrants experienced more positive impacts from the NECP than the regional residents in 1986. In-migrants had higher incomes and educational levels, and were strongly represented in the mining industry and related occupations. According to the Census data, there were 280 regional residents and 1,595 in-migrants employed in coal mining in 1986.²⁷ All of the Tumbler Ridge residents interviewed said that the majority of mine employees during the early years had come from other mining communities in Canada. The direct employment at this time period was dominated by in-migrants.²⁸

Whether direct employment opportunities continued to accrue mostly to in-migrants is questionable. An important consideration is whether employees who leave are replaced by regional residents. Unfortunately, there are no data available to answer this question. QCL's hiring records indicate whether the new employee was from within the region but the company does not have records on whether the terminations were hired from within the region. In addition, QCL's definition of a regional resident is less stringent than the one employed in this analysis. BOC does not keep records of regional hiring; however, the majority of their initial operating employees were hired from other mining communities in BC (Shera et al. 1987).

²⁷ Of the regional residents working in the coal mining industry, 140 lived in Tumbler Ridge, 85 in the region's rural areas, 15 in Chetwynd, 30 in Dawson Creek, 5 in Hudson's Hope and 5 in Pouce Coupe. Thus, 140 regional residents commuted to work at the mines in 1986. This was a significant proportion (38%) of the total number of commuters in 1986, estimated by Shera et al. (1987) to be 365 (215 commuting to work at QCL, 150 to BOC). Of the total 365 commuters, 207 lived in Chetwynd, 93 in Dawson Creek, 13 in Hudson's Hope, and 14 in the region's rural areas; the remainder commuted from outside the study region.

²⁸ This is supported by Shera et al. (1987, 98-114) who examined QCL's hiring records and found that, of 1410 employees in 1985, 987 were from BC and 336 of these were from QCL's regional area (Prince George to Fort Nelson to the Alberta border).

QCL's records indicate substantial hirings from the region (Table 5.1). The mining company's region includes the area from Prince George to Fort Nelson to the Alberta border, which is larger than the study region defined for this analysis. In addition, these hiring statistics must be interpreted cautiously as a local address on an application form is sufficient to qualify the application as regional. During the early years of operation this may be an important qualification on the hiring data; several regional residents commented that many people trying to get employment at the mines used local hotels as addresses. This practice may have declined, if not disappeared, in latter years as the economy improved and job opportunities were not as scarce as they were in the early 1980s. However, QCL instituted a 'Relative Hiring Policy' in 1987 that gives preference to direct relatives of employees, and a number of Tumbler Ridge residents suggested that people may move to Tumbler Ridge and live with their relatives who are employees to enhance their employment prospects. These individuals would be recorded as regional hires in the QCL records.

TABLE 5.1
REGIONAL AND NON-REGIONAL HIRES,
QUINTETTE COAL LIMITED, 1982 - 1989

Year	Total # Hired	# Regional	# Non-Regional
1982	200	97	103
1983	600	312	288
1984	1200	276	924
1985	422	207	215
1986	161	74	87
1987	261	139	122
1988	418	178	240
1989*	309	159	150

* To Oct. 31/89

Source: Dianna Marks, Senior Recruiting Officer, QCL, Nov./89.

QCL's hiring records suggest that, except for 1984, about half of their new employees have been hired from within northeastern BC. However, Quintette hired the bulk of its operational staff in 1984 and most of these were hired from outside the region, reflecting regional residents' perceptions that most of the operating jobs had gone to in-migrants.

Direct coal mining jobs are not the only employment opportunities related to the NECP. The *ex post* analysis of the NECP's employment impacts presented in Chapter 4 suggested that 1,598 indirect and induced jobs in the region were related to the coal mines in 1986. Census data indicate that 605 of these jobs were in Tumbler Ridge, and 90 of these were probably filled by regional residents. The remaining 993 indirect and induced jobs were located in other communities in the region, and most of these jobs were filled by regional residents. Owners and managers of regional businesses that supply goods and services to the mines said that most people had been hired locally for any increase in staffing they experienced because of the NECP. Several people commented that there were plenty of skilled people around who were not working which made local hiring easy and sensible. Outside hiring in these businesses was primarily for senior management or other specialized positions and was limited.

Based on these data, regional residents obtained a maximum of 39% (1,363 jobs) of the total employment (3,473) linked to the coal mining activity in 1986. Regional residents had obtained 15% of the direct jobs and a maximum of 68% of the indirect and induced jobs. This pattern of regional resident versus in-migrant employment may explain many of the distributional trends analyzed above. Most of the jobs in indirect and induced employment categories are lower paying than the direct mining jobs. As in-migrants dominated the mining employment in 1986, they had higher per capita and household incomes than regional residents. Also, the mining companies offer on-the-job training and so the in-migrants have more individuals with higher education.

The results discussed above are partially consistent with the results of the interviews with regional residents. Fifty-five percent of those interviewed believed that few regional residents had obtained mining jobs, and only 12% believed that regional residents had obtained a large proportion of the jobs. Sixty-five percent of those interviewed believed the economic spin-offs from the NECP had been limited. They perceived the number of indirect and induced jobs to be quite small and concentrated in industrial supply businesses.

Women

The Manpower Sub-Committee argued that there were a large number of women in northeastern BC who could fill many of the jobs created by the NECP, and suggested that specific recruitment and training programs oriented to women would improve their employment opportunities and their general economic status in the region (BC 1976b). In a survey of northeast residents completed for the Sub-Committee (Cornerstone 1977), 60% of the 568 women interviewed expressed an interest in mining employment; while the majority were interested in office or clerical positions, 16% were interested in non-traditional employment opportunities. In this section, the NECP's impact on the general economic status of women in the study region is analyzed by examining changes in several indicators. Then, the number and types of jobs held by women at the mines is investigated.

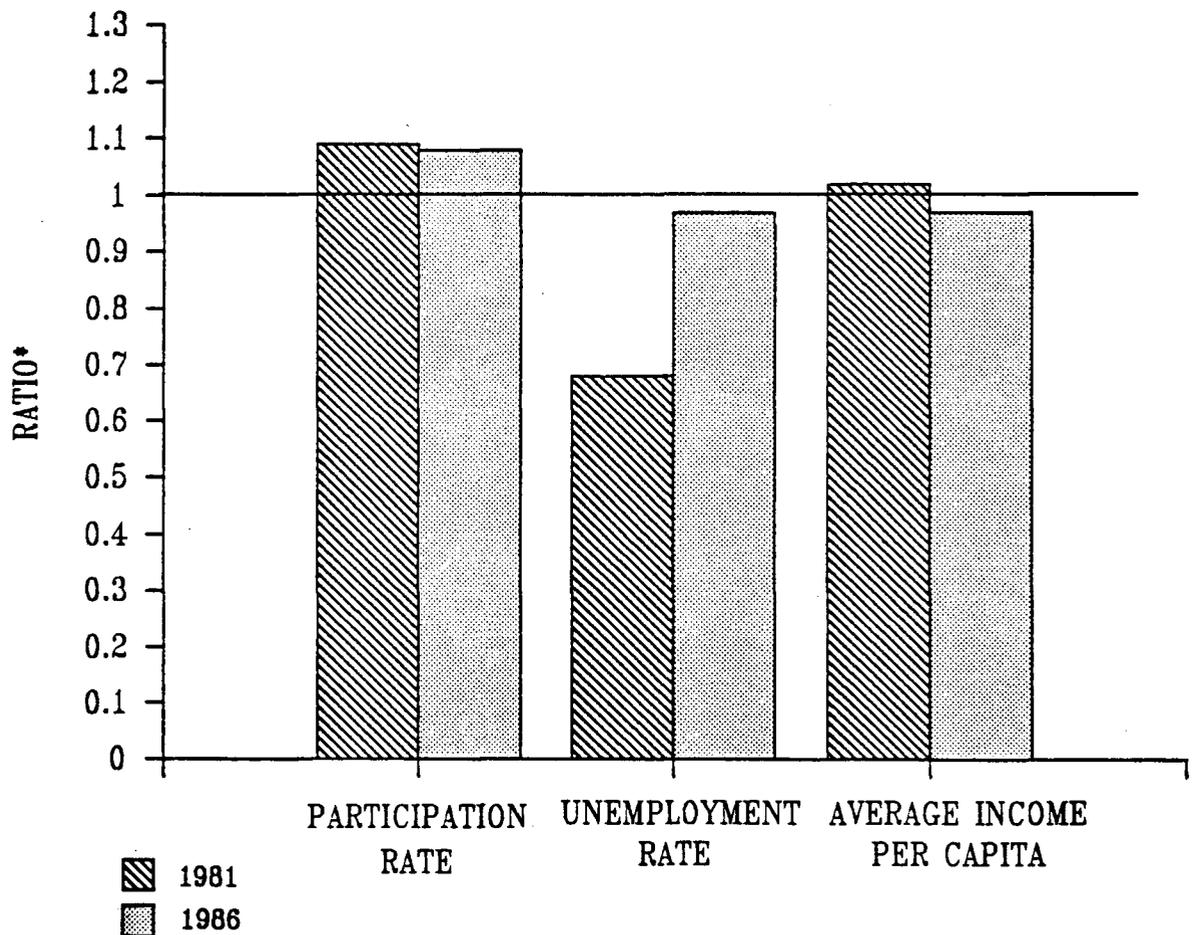
The labour force participation rates of women in the South Peace increased from 53.4% in 1981 to 55.4% in 1986. In both years, these rates were higher than women's rates in BC's resource-based regions (Figure 5.19). The participation rate of women in the South Peace did not grow as quickly as the participation rate of women in BC's resource-based

regions over the time period but the difference is very small, particularly when compared to the observed changes in women's unemployment rates in the South Peace. In 1981, the unemployment rate for women in the South Peace was 7.3%, far below the average of 10.7% for women in BC's resource-based regions. However, by 1986 the unemployment rate for women in the South Peace had climbed dramatically to 16.6%, almost equal to the 17.1% experienced by women in BC's resource-based regions (Figure 5.19). This shift may have been related to the large number of unemployed women living in Tumbler Ridge in 1986; the unemployment rate among women in that community was 24.7%. In addition, the recession's impacts on women's employment levels in the South Peace may have been more severe than in BC's resource-based regions. Women's labour force participation rates increased, but industries that traditionally provide the bulk of employment opportunities for women in resource-based regions, (services, government) experienced relative declines in the South Peace compared to BC's resource-based regions (Figure 5.8).

Paralleling women's worsening employment situation in the South Peace, women's average per capita incomes declined from \$10,733 in 1980 to \$10,646 in 1985 (1985\$C). This decline was against the trend for women in BC's resource-based regions; in 1980, their average per capita income was \$10,510, and in 1985 it was \$10,974. Compared to women in BC's resource-based regions, women's average per capita income in the South Peace went from being better in 1980 to being worse in 1985.

The trends in these three indicators suggest that few of the economic benefits associated with the NECP, especially the high-paying direct jobs, had accrued to women in 1986. However, some individual women have benefitted directly. A total of 78 women were employed by both mines in 1984, increasing to 150 at QCL alone (89 salaried, 61 in non-traditional jobs) by 1985 (Shera et al. 1987). According to QCL management personnel, this increase continues, and by 1989 women comprised 10% of bargaining unit employees

FIGURE 5.19
RELATIVE PARTICIPATION AND UNEMPLOYMENT RATES
AND AVERAGE PER CAPITA INCOME, FOR WOMEN IN
THE SOUTH PEACE AND BC'S RESOURCE-BASED REGIONS
1981 - 1986



* Ratio relates women in South Peace to women in B.C.'s resource-based regions; RBRs = 1.00

Source: Statistics Canada, Census, various years

and 33% of the salaried staff, for a total of approximately 230 employees (115 in non-traditional jobs, 115 in salaried positions). Management personnel at BOC indicated that there were 12 women employed in 1989 (5 in salaried, 7 in non-traditional). QCL encourages women to take up non-traditional employment opportunities, and by 1989 had a large number of women in these occupations. In comparison, BOC does not specifically target or encourage women compared to other potential employees.

The majority of the women working in the coal mining industry in 1986 were in-migrants. A custom tabulation of 1986 Census data suggests that 40 women who were regional residents were working in coal mining; 20 of these women were living in Tumbler Ridge and 20 were living in other parts of the South Peace. This was about 25% of the total number of women working in the coal mining industry at the time, and about 2% of the total industry employment. Data to determine whether the number of female regional residents employed in coal mining has changed with the increasing number of women employed are not available.

Natives and Native Communities

In the Cornerstone (1977) survey of regional residents, 98% of the 78 Native respondents expressed interest in coal mining employment and said they would move to the new town to get a job. All were also interested in taking training. The survey report emphasized the need for training programs and employment incentives to help Native people obtain work at the mines. In this section, the NECP's impacts on Native people are examined.

The aboriginal population in the South Peace area consists of individuals associated with the two Bands (West Moberly and Saultheaux/East Moberly), plus a sizeable Metis community in Dawson Creek, Chetwynd and Kelly Lake. According to the 1986 Census,

there were 2,965 people living in the Peace River-Liard Census Division who said they were single-origin aboriginal people. The total Native population would be much larger, and estimates obtained in interviews with Native representatives in 1989 were in keeping with this expectation. The Director of the Nawican Friendship Centre in Dawson Creek estimated there were 6000 Metis people in the Peace River area, including the north Peace. According to the Tansi Friendship Centre in Chetwynd, people with some aboriginal background within a 20 mile radius of that community numbered between 2400 and 3000 in 1981. Kelly Lake's population was estimated by a community resident to be 250 permanent residents; community members who lived elsewhere would bring the total population of this community up to between 400 and 500. According to Canada's Department of Indian Affairs, there were approximately 180 Band members living on the two reserves at Moberly Lake in 1988. Clearly, people of aboriginal descent comprise a significant proportion of the regional population.

Interviews were conducted with eight representatives of Native communities or organizations. All eight reported that many Native people had high hopes regarding the potential for employment at the mines; this was particularly true of people who lived in and around Chetwynd and Kelly Lake. All those interviewed said that promises of employment were made by industry and/or government representatives, and that many Native people filled out job applications. For example, the Tansi Friendship Centre in Chetwynd acted as a contact point for QCL in 1983 and delivered about 120 applications in 1983/84 to that firm. As far as the Friendship Centre knew, the applicants did not receive a reply from QCL and no-one got a job. This caused great disappointment, as it appears that the applicants thought that filling out the form virtually guaranteed them a job. The general impression among Natives interviewed was that Native people stopped trying to get jobs at the mines after they received no response to their first applications.

In total, less than a dozen local Native people have obtained mining jobs.²⁹ The Kelly Lake representative reported that four of his community's residents worked at the mines; the Dawson Creek representative thought about 5 Metis people had worked at the mines (including the Kelly Lake community); the Chetwynd representatives thought between 5 and 10 people had worked at the mines since they opened (again including Kelly Lake people). Representatives of the two Bands knew of no current members working at the mines, although "a few" of the Sauteaux Band members got jobs at the start. In total, it appears that 10 Native people from the South Peace are currently working at the mines, and that about another 10 once worked at the mines. Several respondents reported that individuals in the latter group held their mine jobs for about 6 months to a year.

The major obstacles to Native employment were seen by the respondents as being a mismatch between mining company educational and skill requirements and Native qualifications. There was bitterness over the early promises of jobs and the lack of effective follow-through by the companies and planners, as the following quotes illustrate:

A lot of people put their names into the mines on applications but no one got work. The big factor was that they wanted Grade 12 education. Even if I had 20 years experience driving machinery, I couldn't get a job because I didn't have enough education.

We wanted jobs in the coal industry. People told us that we would get jobs. They always say this ...

Many Native people expected that Quintette and Bullmoose would just hire them because they applied. But the skills (bush work skills, driving skidders, operating a chain saw)

²⁹ The statistics available from the Census and the mines are consistent with these estimates. In 1989, QCL estimated that there were about 25 Native people working at the mine, but that only about one half were from the region. BOC estimated there were 6 Natives working at the mine, mostly from Chetwynd. Data obtained from Employment and Immigration Canada, based on the 1986 Census, indicate there were 30 people of aboriginal descent working in the mining industry in the South Peace region in 1986. According to Shera et al. (1987) there were 27 Natives working at QCL in 1984. Native people interviewed in Chetwynd commented that Native people came from outside the region to get a job at the mines; so it is possible some of these employees were not from the region.

were not what the mines needed - especially when most of them couldn't read.

There were promises made, we had meeting with North East Coal in Kelly Lake. They were willing to hire and train people, if the people were willing. A lot of people said we're willing to do it, but when it did open the hiring policy changed: if you haven't got any qualifications you can't work at the mine. We didn't have time to train anybody ... It was a big scam from my point of view. A few people applied and waited and waited and never got called, so others didn't bother. The people who applied never even got a response.

The NECP's negative impacts on the Native population in the area relate to the disappointment and unfulfilled promises regarding employment opportunities, and to the increased activity in the area because of the project. Road improvements have opened what was essentially a wilderness area to increased access by recreationists, resource exploration companies and others. Increased access affects hunting and trapping patterns and yields, along with other land-based, traditional activities. The cumulative impacts of resource development in this region, of which the NECP is only one project, are gradually eroding the land base of the aboriginal people and reducing their ability to be self-reliant. In addition, the growth of the regional economy is affecting Native people in a number of other ways (personal, social, cultural, spiritual) that are negatively perceived, as the following quotes illustrate.

There's lots of skidoos and hunters in Tumbler Ridge and they're all over and the more hunting they do, the more serious problem we're having with our way of life. You know moose, most of the people live off that, it's a source of a way of life. There's a real decline in the animals - mostly moose, and caribou and elk.

There were a lot of medicinal roots in the Bullmoose area but these are destroyed. Berry picking places are destroyed by Cats. A consequence is that people's eating and thinking habits are dramatically changed. This may be one reason why alcoholism is such a bad problem.

A lot more southerners are up in the region hunting. The animal patterns are messed up with roads, rail and mining activities.

The Sukunka River area and other places in the region have been affected. Now, we have to go up into the mountains to catch fish like we used to.

You don't feel safe walking out there (on the road through Kelly Lake) at night with the heavy tankers, trucks, to Alberta. They sneak through Kelly Lake to get away from the scales. It has affected the quality of the roads. You have to change the windshield in your truck every 3 months. All the people in Tumbler Ridge go into Alberta to do their shopping. On Friday nights there's lineups of people going to Alberta and coming back on Sunday nights. In the summertime it's really bad. I live just 60 feet from the road and I get so much dust you can't even leave your window open.

We have suffered from the social impacts of all of the mega-projects in this region ... Women are 80% of the Band's membership. We have problems with non-reserve non-Native people coming in and using, abusing, and leaving them with various social problems. They disrupt how we fund our basic services ... We are fighting a losing battle. The biggest thing is the external influence on the Band - the loss of spirituality and the connection to traditions.

It seems like we're always the last to be consulted. We know the area however. Indian people need to be involved initially, as part of an ongoing process, a negotiating process. We should be involved because we live here - we can't leave or sell out. This is our permanent community.

Non-Native Communities

The provincial government's forecasts of employment and population in the region's non-native communities are significantly different from the actual figures, as shown in Table 5.2.

TABLE 5.2
FORECAST AND ACTUAL POPULATION AND EMPLOYMENT,
NON-NATIVE COMMUNITIES IN THE SOUTH PEACE, 1986

Community	Forecast	Actual	Actual as % of Forecast
Dawson Creek			
employment	7,616	4,445	58.4
population	19,039	10,544	55.4
Chetwynd			
employment	1,752	1,225	69.9
population	4,379	2,774	63.4
Tumbler Ridge			
employment	2,408	2,090	86.8
population	6,019	4,385	72.9

Source: Forecasts - BC (1981c)
 Actual - Statistics Canada, 1986 Census.

Additional data on economic conditions in these communities in 1986 (Table 5.3) suggest that Chetwynd was the only community in the study region in 1986 that captured some of the growth associated with the NECP. Its population, employment, and average household income increased.³⁰ Dawson Creek declined over the 1981 to 1986 period, while the rural area remained relatively stable.

³⁰ The unemployment rate and the total number unemployed increased drastically in Chetwynd because of a six month strike at one of the town's lumber mills in 1986, yet the total household income increased.

TABLE 5.3
 AVERAGE HOUSEHOLD INCOME AND UNEMPLOYMENT,
 NON-NATIVE COMMUNITIES IN THE SOUTH PEACE, 1981 - 1986

Community	1981	1986
Dawson Creek		
Ave. HH Income *	33,022	27,928
Unemployment Rate	7.7	17.4
No. Unemployed	550	935
Chetwynd		
Ave. HH Income *	34,952	35,037
Unemployment Rate	4.8	18.1
No. Unemployed	75	270
Tumbler Ridge		
Ave. HH Income *	0	54,945
Unemployment Rate	0	9.9
No. Unemployed	0	235
Rural Area		
Ave. HH Income *	32,782	30,819
Unemployment Rate	6.0	14.5
No. Unemployed	285	640

* All income figures are in 1985\$C and are for the year prior to the Census
 Source: Statistics Canada, 1986 Census.

While the Census data suggest that the region's communities received few benefits from the NECP, these communities might have been significantly worse off without the NECP, as the *ex post* analysis of employment and population impacts presented in Chapter 4 indicated. Of the total number of jobs related to the NECP, 2,090 were in Tumbler Ridge, and the rest were elsewhere in the region. Commuting data for the two mines suggest there were 365 people commuting to work at the mines in 1986; 207 people were commuting from Chetwynd, 93 from Dawson Creek, 13 from Hudson's Hope, 14 from the

region's rural areas, and the remainder from outside the region.³¹ In addition to these direct jobs, there were 993 indirect and induced jobs related to the NECP in the existing regional communities. Most of the indirect and induced jobs were located in Dawson Creek and Chetwynd; based on interviews with mine purchasing personnel and Tumbler Ridge residents regarding their purchasing habits, perhaps 80% of these jobs were in Dawson Creek and 20% in Chetwynd. The perceptions of selected regional residents regarding the benefits and costs to their communities were investigated and the results are reported below.

Dawson Creek

Twenty-one community representatives were interviewed in Dawson Creek. Thirteen managed retail stores, and four managed mining supply businesses. In addition, interviews were conducted with the Manager of the Chamber of Commerce, the Mayor, the City Administrator, and the Economic Development Coordinator. One of the retail merchants was also president of the Ratepayers' Association.

The NECP is generally regarded as very important to the local economy by politicians and businesspeople; however, 81% of those interviewed believed the mega-project's impacts had not been as good as they might have been. Dawson Creek experienced a modest boom-bust effect. During the construction period (1981-1983), before Tumbler Ridge was finished, and in the early years of the operating phase before many stores opened in Tumbler Ridge (1983-1985), Dawson Creek merchants did well. The NECP mitigated the effects of the national 1982-83 recession. Business declined in 1985, but has been improving steadily since 1986.

³¹ In 1989, there were 216 people commuting to work at the mines; at least 99 from Chetwynd and 15 from Dawson Creek. A change in the mines' housing policies in 1988 led to a number of people moving to Tumbler Ridge who were previously commuting.

The mine helped us fight off the impact of the recession. 1983, 84 and 85 were the best years as Tumbler Ridge had nothing out there for shopping at all.

Dawson Creek was better prepared to handle considerably more than it got. The community hasn't received what it asked for, worked for. We pioneered a lot of stuff, welcomed those people, never chased them away, but did deny them access to our facilities by forcing them to travel the (unpaved) Fellers Heights road to get to Dawson Creek. The coal project didn't build the Dawson Creek community the way it was expected to.

Today the NECP is seen as a significant but not crucial boost to the town's economy. Forty-eight percent of those interviewed believed that most of the indirect and induced jobs related to the NECP were located in Dawson Creek, and that this created a significant amount of employment in the local economy (perhaps 25% of all Dawson Creek's retail sales). Another 33% believed that these indirect jobs were less important and concentrated in the mining supply and a few retail businesses. Forty-eight percent of those interviewed believed the NECP had improved the entrepreneurial climate as local businesses respond to the large, but demanding, opportunities created by a large international mining operation (requiring local businesses to adopt more competitive purchasing and pricing behaviour, stock a wider range of products, and offer 24 hour service). Fifty-seven percent believed it had offered significant new opportunities to young people, and 33% said the infrastructure improvements, especially to the road network, had positive impacts on the economy. Thirty-three percent believed the NECP had stabilized the economy during the recession, and 33% believed it had raised the area's profile with investors. Businesspeople with a direct link to the mining operations stressed the project's importance to the Dawson Creek economy, while others were less emphatic, as the following quotes suggest.

NECP is vital to the whole economy. We (a department store) wouldn't stay in business without it.

If Quintette coal shut down tomorrow, we (our transport company) would be in trouble and Dawson Creek would be in trouble ... There is so many people that do business with them, that it would throw everybody in to a tailspin,

including the transportation sector. If they shut it down it would be terrible - terrible for Chetwynd too because they have lots of business with Quintette.

If the mines closed down we wouldn't have to cut the same number of employees as the percentage of Tumbler Ridge related business. Some businesses (however) would have to close and lose all employees as the Tumbler Ridge extra business just keeps them going. It is very important to us ... Business did pick up when the mines opened. The population in Dawson Creek decreased and the mines enabled us to maintain.

There is resentment that, because the direct road from Dawson Creek to Tumbler Ridge is only about to be paved this year, Dawson Creek lost potential business to Chetwynd and to Grande Prairie in Alberta. There is also resentment that the new town of Tumbler Ridge was built at all, rather than a high speed commuter rail link from Dawson Creek. School and recreational facility construction costs in Tumbler Ridge were seen as responsible for a 35% jump in Dawson Creek property taxes this year by 62% of those interviewed.

Only 10% of those interviewed believed that the NECP has had some negative social or environmental impacts on the community or area. For those mentioning environmental impacts, the sacrifice of wilderness value was balanced by the improved access to the tremendous recreational opportunities in the area.

Chetwynd

Eleven people were interviewed in Chetwynd. Six were businesspeople; two from the industrial/mining supply industry, two from the construction supply industry and one from the retail industry. The other businessperson managed the local Chamber of Commerce. Two of the businesspeople serve as elected representatives in the local government, one as Mayor. In addition, interviews were conducted with the Deputy Clerk, the Economic Development Officer, and three newspaper people.

Ninety-one percent of those interviewed believed that the NECP had very little influence on Chetwynd's economy. All those interviewed believed the town has received far fewer economic benefits than it expected to, and most people attributed this to the construction of a new town and the hiring policies of the mines. During the construction and early operating phase, Chetwynd boomed. However, as Tumbler Ridge's commercial sector developed, Chetwynd received fewer economic benefits. At this point, most of those interviewed believed Chetwynd would not be strongly affected if the mines close down, as the following quotes suggest.

People aren't worrying about the mines closing down ... if one thing closes down, the next will pick up the slack.

Starting from when BP was going to do it, and I went to that town meeting, everyone was going to be in Chetwynd. When they went ahead and built Tumbler Ridge, we said 'OK, we'll get some benefits from it', but the jobs weren't available because you had to be skilled miners. It wasn't the impact everyone expected.

The expectations were quite high, particularly with what the mines and businesspeople and government people were saying. Everyone was gung ho and when the construction was over - nothing. Our kids couldn't buy a job at the mines. They wanted people to move into Tumbler Ridge and buy a house. They also wanted people with existing skills so they brought them into Tumbler Ridge from places like Nova Scotia.

Ninety-one percent of those interviewed believed the present economic benefits from the NECP are concentrated in four or five mining supply businesses and a few service businesses (gas station, grocery store, drug store, dental clinic). Sixty-four percent of those interviewed did not believe a lot of Chetwynd residents commute to work at the mines. The increase in the regional tax base caused by the NECP was viewed positively by 36% of those interviewed as it makes it easier to get capital funding for regional projects. The addition of another community to the regional settlement pattern was also seen as positive by 36% of those interviewed as it added another set of teams to the

region's recreational stock, and opened up opportunities for the smaller communities to cooperate on projects and activities that they could not undertake alone.

It's had some positive effect. Chetwynd people benefit because your stores would have a better selection.

It must have had stability impacts, but this affected people from mining communities in Newfoundland and Nova Scotia most.

There is resentment in Chetwynd regarding the low rate of local hiring and the decision to build a new town. The reason for the low level of local hiring is seen to be ignorance on the mines' part that Chetwynd residents have the skills needed to work in a mine. The decision to build a new town is seen as one that has deprived Chetwynd of growth and new community facilities that they have waited a long time for. There is resentment that Tumbler Ridge residents got these facilities right away. Sixty-four percent of those interviewed said there had been inflationary costs associated with the early years of the NECP, but these short-term disruptions were considered to be better than the town's experience with previous large construction projects. No current negative social impacts were identified. Three types of environmental costs were noted, but only by 10% of those interviewed.

It was just a token attempt to hire locally at the beginning. People would go to the hiring halls and offices and be told they couldn't be used when standing next to them was someone speaking French. This really reinforced the perception that it wasn't even BC people who were benefitting from the project. The early 1980s were a pretty desperate situation for a lot of people in the area and seeing jobs so close at hand going to people from elsewhere was really unfair.

People thought they were going to get rich and that there would be no more unemployment and this is not what has happened. When this is all over it won't affect the amount of unemployment in the area one iota because there will just be more people coming in to take those jobs and the people who are on unemployment now will still be on it.

There is a natural resentment from people in Chetwynd that Tumbler Ridge people can come in and get a new townsite and get everything brand new while we have to wait.

Generally, the whole northeast of BC has been negatively impacted with the mega-projects and the logging. Ten years ago in Ft. Nelson, I couldn't feel the wind in the summer. Now, it is much breezier with all of the logging which has gone on.

Originally people thought that Tumbler Ridge would just be the mines with a very small population out there but the majority in Dawson Creek and Chetwynd. Then they built the town and Tumbler Ridge got all the facilities that Chetwynd could have had.

Rural Areas

Three members of the Board of the Peace River Regional District were interviewed. All were long-term residents of the area and had represented their electoral areas on the regional district board for at least 8 years.

Benefits generated by the NECP for the region's rural residents were seen to be mostly associated with the employment opportunities provided in the operating phase, particularly for young people, and in the boost the project provided to the regional economy during the recession. Generally, however, all agreed that expectations were much higher regarding the employment opportunities. Most of the people getting jobs are from the rural area around Chetwynd. In addition, the extra tax revenues generated by the mega-project were perceived to be a positive effect by two of the three respondents.

The costs of the NECP for the region's rural areas were seen by all three representatives to be in the areas of potential tax increases to service the large municipal debt associated with the new town, and environmental degradation. However, environmental costs are seen as an unavoidable component of resource development. Generally, the rural

representatives were ambivalent about the NECP, believing it has not done very much for their constituents. However, they saw mega-projects as unavoidable in the north.

Of all the mega-project, I think Tumbler Ridge is one of the better ones as far as an impact to society goes and as far as an impact to our environment. Tumbler Ridge confines themselves to their own area.

We had great expectations (about local benefits). Maybe we had visions of grandeur because it was a large mega-project.

(The money spent on mega-projects) should be spent on economic development projects, large and small, to create a tax base to expand services and build hospitals, and so on. We are short on manufacturing of our commodities - feed mills, feed lots, oil manufacturing, lumber manufacturing. This is what we're short on.

Summary

The distributional analysis suggests that a large proportion of the most visible aspects of the NECP's economic benefits, the direct jobs in the coal mining industry, have accrued to in-migrants. The Census data indicated that in-migrants were wealthier, had higher education levels, got most of the direct jobs, and dominated the new occupational opportunities when compared to regional residents. However, regional residents apparently gained more of the indirect and induced employment related to the NECP than in-migrants did, and the NECP may have kept many regional residents employed during the early 1980s who would otherwise have lost their businesses or jobs because of the recession. Regional residents without direct linkages to the coal mining operation were less aware of these economic benefits in their communities than businesspeople in the industrial supply sector were.

The two other groups examined in this distributional analysis, women and Natives, experienced limited positive impacts from the NECP. Few regional women worked in the coal mining industry in 1986. Women in Tumbler Ridge had a very high unemployment

rate in 1986. The NECP apparently did not ameliorate the trend to higher unemployment levels for women in BC's resource-based regions between 1981 and 1986. Natives have experienced negative impacts on land-based activities like hunting and trapping because of the NECP, and have been disappointed by the unfulfilled job promises. Very few Natives from within the region have obtained jobs at the mines. The continuing expansion of resource development activities in this region, of which the NECP is just one project, is having a cumulative negative impact on the Native population. In addition, Kelly Lake residents are negatively affected by the increased road traffic passing through their community.

The community-oriented distributional analysis suggests that the NECP provided an important stabilizing influence for Dawson Creek in the early 1980s, especially its retail and service businesses. Other positive impacts in this community were more subtle, such as improvements in the entrepreneurship of mining supply businesses. Regional residents interviewed in Dawson Creek did not believe the community had experienced negative impacts because of the NECP. In Chetwynd, the economic benefits from the NECP did not form a strong impression on the residents' minds. Nevertheless, the NECP has had an important influence on the community's economy; many people working at the mines live in Chetwynd, providing an important source of income for local businesses and government. Perhaps the reason Chetwynd residents downplayed the importance of the NECP in their economy is that, when the decision to proceed with construction of a new town as part of the NECP was made, their disappointment was so large that any benefits eventually accruing to their community were inconsequential in comparison to their expectations. Chetwynd bore significant costs because of these very high expectations; there was a boom in real estate prices and land-based investment in anticipation of large levels of in-migration. In addition, there was a very high level of disappointment among community members regarding the level of local hiring that occurred.

5.5 SUMMARY

The provincial government expected that the NECP's impacts on the Peace River region would be immense, creating employment and business opportunities while diversifying and strengthening the region's economy. The government was interested in maximizing the number of these opportunities that were taken up by regional residents and particularly members of target groups in the region; the Manpower Sub-Committee completed a number of studies oriented to improving the participation of regional residents, particularly Natives and women, in the NECP.

The analysis presented in this chapter suggests the NECP created economic growth which stabilized the region between 1981 and 1986; employment and businesses were stabilized, the impact of the recession was dampened, there was growth in regional market size, education levels in the population 15 years and older increased, and average per capita and household incomes grew. Indirect and induced jobs were created or maintained in existing communities to the benefit of regional residents. In 1986, regional residents had obtained 15% of the direct mining jobs, and may have filled 68% of the indirect and induced jobs associated with the coal mining industry. About two-thirds of the total number of indirect and induced jobs were located in existing communities in the region.

However, the distributional analysis suggests that the higher income and education levels were concentrated in the ranks of people who had moved to the region within the past five years, particularly those individuals living in Tumbler Ridge. In 1986, in-migrants filled the majority of direct mining jobs (85%), and few individuals from target groups had gained employment. Women experienced higher unemployment and lower incomes in 1986 than in 1981, and the NECP apparently was unable to alleviate this trend. The

employment situation of women may improve if induced employment fully responds to the large increase in primary sector employment. However, for Natives in the South Peace, the negative impacts of the NECP are long-term and cumulative. Very few Native people have gained employment in the mining industry, yet continuing resource development and economic change in the region place pressures on traditional land-based activities and social systems. The potential for projects like the NECP to benefit Natives is limited without joint action on the part of governments and Natives to increase their participation.

In spatial terms, the economies of the two larger communities in the South Peace, Dawson Creek and Chetwynd, were stabilized by the NECP during the early 1980s. Individual businesses in these communities, and particularly in Dawson Creek, derived tangible and intangible benefits from their dealings with the mines. For example, several businesses that had contracts with the mines now have approximately 50% of their business associated with the mining industry, and believe they are more competitive than they were before. The former, tangible, benefit suggests that these businesses would be a lot smaller without the mining industry's presence in the region. In the case of at least one of the businesses, the mining industry has kept them in the region. The latter, more intangible, benefit has important implications for regional economic development in the South Peace. A more competitive business sector and the enhancement of entrepreneurial abilities, is a key component of regional economic development. The NECP's impacts on regional entrepreneurship may be one of its more important, and lasting, positive impacts.³² However, this must be treated with caution; the entrepreneurial skills developed are oriented to serving the needs of very large exporting firms with very high volume demands. Also, the majority of the skills being developed are in relatively low LVA

32. My findings suggest that this positive impact is strongly associated with the management style of QCL, and the commitment of that company to purchasing as much from local suppliers as possible. Numerous business people interviewed in this study said that QCL was a very demanding customer, but interested in working out arrangements with local businesses.

industries, such as sourcing capital equipment and replacement parts that are made in the US or Japan.

The level of economic benefits obtained by existing residents and communities were significantly below their expectations. This has generated a high level of disappointment with the NECP and its regional development impacts. The disappointment is focused on two issues. First, the amount of local hiring during the early operating years frustrated many regional residents. Second, the decision to build a new town is perceived to have hurt existing communities, depriving them of the benefits of a larger population and long-awaited new facilities. The growth that has occurred is not perceived to be associated with large environmental costs, except by those with a stake in the wilderness character of the area such as the Native people and hunters.

Overall, the impacts of the NECP on regional economic development in 1986 were limited. Few direct jobs had been obtained by regional residents, and very few women and Natives from the region had gained mining employment. There was significantly less growth than projected by the Province, and the NECP did not alleviate unemployment in the region. Average per capita incomes increased, but the distribution of income within the region did not change. The anticipated diversification of the economic base, associated with a diversification of resource exports, is a double-edged sword. In 1986, the regional economy was more specialized than it was in 1981, and thus perhaps less resilient to outside influences. Should this continue over the long term it could make the region less stable, especially considering the current uncertainty associated with the future of the NECP. Some of the hoped-for business and entrepreneurial development has occurred, but may have limited application beyond the links to natural resource mega-projects.

CHAPTER SIX

THE NECP'S ECONOMIC VIABILITY

6.1 INTRODUCTION

The Economic, Financial and Marketing Analysis Sub-Committee was responsible for summarizing the information generated in the planning studies into an overall economic evaluation of the NECP. However, the NECDO replaced the planning task force during the implementation phase and so the final economic evaluation was prepared by staff in BC's Ministry of Industry and Small Business Development.¹ This final evaluation represents the culmination of the formulation and analysis components of the NECP's planning process, and should summarize the governments' expectations regarding the NECP.

The summary economic evaluation was completed using benefit-cost analysis. This chapter reviews the pre-project benefit-cost study, and then presents the results of an *ex post* analysis. The pre-project and *ex post* analyses are compared, and potential reasons for any discrepancies explored. The discussion then returns to the pre-project analysis and assess the reasonableness of the methodological approach and the assumptions used by the analysts.

All dollar value estimates in this Chapter are 1980 Canadian dollars unless otherwise noted. Inflation and deflation of dollar estimates in various years used the Implicit Price Index, GDP component, published by Statistics Canada. Year 0 for the pre- and post-project analyses was set at 1980, and the project lifespan was 1981 to 2003, with coal production beginning in 1983. The pre-project and *ex post* analyses were conducted from a

¹ This Ministry was previously the Ministry of Economic Development.

national perspective, as compared to the smaller regional perspective of the previous two Chapters.

6.2 SUMMARY OF THE PRE-PROJECT ANALYSIS

The pre-project analysis disaggregated the distribution of benefits and costs associated with the NECP so that a clear understanding could be developed of "... the relationships between public outlays and returns from various aspects of the developments and the private profitability of the development." (BC 1982a, 11). The four sectors established in the analysis were mining, transport, the provincial government, and the federal government. The pre-project analysis first completed a discounted cash flow analysis for the entire project and each of the four sectors. Then this financial analysis was modified to become a benefit-cost analysis. The primary economic adjustments made were the inclusion of shadow prices for labour and foreign exchange, and the valuation of positive and negative externalities. This methodological approach led to the inclusion of corporate income taxes, mining profits taxes, and capital taxes as costs to the private companies involved in the NECP and benefits to the governments. This unusual treatment of taxes in benefit-cost analysis, and its impact on the pre-project analysis, are discussed in later sections of this chapter. The discount rate used in the pre-project analysis was 10%.

After explaining the analytic framework, the pre-project analysis reported on the government's assessment of future markets and prices for metallurgical and thermal coal. Knowing that the NECP's long-term future depended on future coal prices, six percent of the total public planning budget was allocated to market studies, and these were summarized in the benefit-cost report. As metallurgical coal is the NECP's primary output, only the assumptions relevant to metallurgical coal markets and prices are summarized here. The pre-project analysis assumed that Japanese demand for

metallurgical coal would continue to grow, that Canadian suppliers would be able to increase their share of the Japanese import market, that the real price increases for metallurgical coal that occurred during the 1970s would be sustained, and that there would continue to be real price increases in the 1980s. Underlying all of these assumptions was the belief that the real increases in commodity prices that occurred during the 1970s were a break with historical trends.

The price scenario used in the central case of the pre-project analysis assumed the prices paid for metallurgical coal would be equal to the contract prices until the time of the first price reviews, occurring on April 1, 1987 for QCL and April 1, 1989 for BOC. After the price review, the contracts specified that prices would be based on the prevailing competitive market price for Canadian coking coal adjusted for quality differences. The pre-project analysis forecast that the competitive price for northeast coal would rise in real terms by 3% per year between 1987 and 1990, and 0.6% per year thereafter.²

Following the market analysis and price projections, the pre-project analysis reviewed the coal resources in northeastern BC and established a central case for analysis. The central case was based on production from two mining properties, QCL and BOC, beginning in 1983 and continuing until 2003. Total annual metallurgical and thermal coal production from the two mines between 1985 and 2003 was projected to be 6.7 MMT and 1.0 MMT, respectively.

The pre-project analysis then turned to an estimation of the financial costs of the central case. All costs were presented in constant 1980 dollars, and the following real cost escalations were assumed:

- a) all capital costs would increase by 2% per annum between 1981 and 1984,

² Thermal prices were assumed to increase at a greater rate than metallurgical coals over a longer period of time.

- b) mine operating costs and trucking costs would increase by 2% per annum until 1989, and
- c) rail operating costs would increase by 2% per year between 1980 and 1984.

For the mining sector, capital and operating costs were provided by the mining companies. Other costs, such as royalty and tax payments were estimated using a financial model of coal mining operations. In estimating these costs it was assumed the capital costs were financed through 100% equity investment.

The transportation sector costs were divided into railway, port and highway costs. The railway costs were prepared by a consulting firm using a computerized model. The final access route to the northeastern coal fields was selected in 1980, and the cost estimates were based on annual shipments of 7.7 MMTPY of coal.³ Port capital and operating costs were also estimated by a consulting firm, and the province's analysts used these costs as the basic data in a financial model to estimate corporate income taxes. Highway costs were estimated by the government's analysts. The upgrading required for railway crossings was allocated 50% to coal development and 50% to increased grain shipments,⁴ and divided equally between the provincial and federal governments.

The final category of costs was associated with the support facilities required by the project, comprised of electrical power costs and local townsite and government services costs. Provision of power to the townsite and the mines was estimated to cost \$25 million in present value (PV) terms. The analysts assumed that the cost of the townsite facilities would eventually be met by tax revenues; however, the temporal discontinuity of the costs

³ The capital costs of the Tumbler Ridge branchline were assigned to the provincial government's account.

⁴ Thus 50% of these costs were excluded from the NECP's benefit-cost analysis.

and benefits would lead to a net cost of \$5 million (PV), which the provincial government would bear.

Gross financial benefits from the NECP were based on the coal prices and sales assumed in the central case; these were projected to have a present value of \$3,316 million. The gross revenues were allocated among the various sectors according to the assumed transportation charges and taxes. The present value of mining sector revenues was estimated to be \$2,326.6 million, with QCL receiving \$1,815.0 million, and BOC receiving \$511.6 million. The present value of gross revenues to the rail transport sector was \$810.8 million, with \$503.7 million received by the CNR, \$216.1 million by the BCR, and \$91.0 million by the BC government from the Tumbler Ridge Branchline surcharge.⁵ The port revenues were projected to have a present value of \$146.4 million. Government financial revenues consisted of royalties and taxes; the present value of total provincial and federal revenues was estimated to be \$230.9 million and \$134.0 million, respectively. Of the provincial government revenues, the mining profits tax, the capital tax and the corporate income tax accounted for \$149.5 million of the total. All of the federal government revenue was from corporate income taxes.

The comparison of financial benefits and costs to the various sectors under the central case scenario suggested that all sectors except the provincial government would sustain real rates of return greater than 10% on their capital investment. The present value of total net benefits were estimated to be \$275.8 million, distributed as follows: \$56 million to the mining sector, \$144.9 million to the transport sector, \$108.4 million to the federal government, and a loss of \$33.5 million to the provincial government (Table 6.1). The negative value in the provincial government sector occurred because the Tumbler Ridge

⁵ This surcharge was transferred to the provincial government's account to be consistent with the decision to place the capital costs for the branchline in the provincial government account.

Branchline capital costs and surcharge revenues, which generated a deficit, were taken from the transport sector and moved to the provincial government sector. The analysts argued this deficit transfer, and the lower rate of return in the Province's account, was justified because of the Province's role as a "... catalyst for a development which is expected to have far-reaching economic impacts as production expands over time." (BC 1982a, 152).

TABLE 6.1
NET PRESENT VALUE OF NET BENEFITS,
PRE-PROJECT ANALYSIS
(Millions of \$1980C)

	Financial Appraisal	Benefit-Cost Analysis
MINING SECTOR		
QCL	\$24.5	\$24.5
BOC	31.5	31.5
	56.0	56.0
TRANSPORT SECTOR		
CNR	146.0	146.0
BCR	14.0	14.0
Port	(15.1)	(15.1)
	144.9	144.9
PROVINCIAL GOVERNMENT SECTOR		
Royalties and Taxes	230.9	230.9
Roads, Power, Port, Town	(88.3)	(88.3)
Tumbler Ridge Branchline	(176.1)	(176.1)
Shadow Price Labour	0	25.0
Shadow Price Foreign Exchange	0	13.0
Externalities	0	5.0
	(33.5)	9.5
CANADIAN GOVERNMENT SECTOR		
Taxes	134.0	134.0
Roads, Port, Navigation	(25.8)	(25.8)
Shadow Price Labour		25.0
Shadow Price Foreign Exchange		120.0
	108.2	253.4
PROJECT NET BENEFIT	\$275.6	463.8

Source: BC 1982a, 147

After completing the financial appraisal, the pre-project analysis investigated the economic adjustments required for a benefit-cost analysis, focusing on shadow prices for labour and foreign exchange, and externalities in the socio-economic and environmental areas. Rather than adjusting the financial costs or revenues of the project to reflect any changes indicated by this economic analysis, the differences were treated as additional benefits or costs and recorded in a separate account.

In addressing the issue of a shadow price for labour, the provincial government's analysts assumed that the social opportunity cost of labour in the construction phase would be equal to the financial payments,⁶ agreeing with an earlier economic appraisal of the NECP completed by the Department of Regional Economic Expansion.⁷ For the operating phase, however, the provincial analysts assumed that some of the operating phase jobs would be taken by previously unemployed people, or people who had been employed elsewhere at a lower wage.⁸ The pre-project analysis estimated that the social opportunity cost of labour in the operating phase was equal to 90% of the actual wage payments; thus, a social benefit equal to 10% of the present value of the operating phase wage bill was generated. The present value of this benefit was calculated at \$50 million, and was divided equally between the provincial and federal government sectors.

⁶ This assumption presumes that there is very little unemployment in the construction industry or, more specifically, in the large construction unions that are generally involved in large-scale construction projects. Thus, the cost of using this labour in the NECP is represented by the value of goods and services produced in the activities it would have been involved in. Further, it was assumed that the wages paid are an adequate reflection of the contribution of labour to the value of goods and services produced.

⁷ This was an internal government document not available to the public, but referred to in the pre-project analysis.

⁸ The pre-project analysis assumed that many of the operating phase jobs would be relatively low in skill requirements.

The pre-project analysts argued that the net exports⁹ arising from the NECP would generate a social benefit for the Canadian economy in excess of that reflected by the free market exchange rate. An increase in exports raises the value of the Canadian dollar, and either allows an increase in the previous level of imports, or a decrease in exports for the same level of imports.¹⁰ The extent to which the social opportunity cost of the net exports is greater than the free market exchange rate depends on tariffs, sales taxes and export subsidies. While earlier studies had indicated that the opportunity cost of foreign exchange was between 13% and 15% greater than the exchange rate, the provincial government's analysts noted that more recent work on the opportunity cost suggested the premium was closer to 8%. Assuming that net exports were equal to half of total exports, (i.e. allowing for the offsetting costs of the NECP associated with imports and labour displaced from export industries), the analysts reduced the net economic benefit generated by foreign exchange earnings to 4% of the gross foreign exchange earnings of the NECP. The present value of this economic benefit was estimated to be \$133 million, and was assigned 90% to Canada and 10% to BC.

Externalities in social and socio-economic impacts and resource exploitation and environmental impacts were also considered in the pre-project analysis. The provincial analysts argued that negative social and socio-economic impacts were likely to be of short duration, while positive impacts would be experienced over a longer period. Due to the difficulties of assigning dollar values to this type of impact, the analysts assumed that,

9 Net exports for the NECP are equal to the total value of all goods and services exported, primarily coal, minus the total value of all goods and services imported, such as capital equipment, and minus the net exports generated by labour required for the NECP that was displaced from export industries.

10 Theoretically, both will generate social benefits for Canada. Because of tariffs, imported goods are valued in Canada at their post-tariff price while the actual cost of acquiring these goods is their pre-tariff price. The tariff, therefore produces a social benefit for Canada (willingness-to-pay exceeds opportunity cost). Reducing export requirements to pay for existing levels of imports also theoretically generates a social benefit for Canada because of export subsidies, which mean that the value of production in Canada achieved by releasing labour and capital from export industries may be greater than the value of the exports.

overall, there would be no net effect. The resource exploitation and environmental impacts however, were considered to generate a net economic benefit with a present value of \$5 million. The net benefits of increased resource exploitation in the region from forestry and oil and gas activities was projected to be \$9.5 million. The present value of environmental costs associated with increased resource exploitation in the area was projected to be \$4.5 million. The net benefits were assigned to the provincial sector.

The economic benefits were then incorporated into the financial analysis. The present value of the NECP increased to \$463.8 million, with the mining sector receiving \$56 million, transport \$144.9 million, the provincial government \$9.5 million, and the federal government \$253.4 million (Table 6.1).

Sensitivity analyses were conducted to test the robustness of these results to variations in the key parameters of the benefit-cost analysis. The factors analyzed were expanded production, varying coal prices, varying discount rates, and lower cost escalations. The expanded coal production scenario added 3.8 MMTPY to metallurgical coal sales, and extended the time frame by 7 years. The net present value of total project net benefits increased to \$985 million under this scenario, distributed as follows: \$151 million to the mining sector, \$244 million to the transport sector, \$184 million to the provincial government sector, and \$406 million to the federal government sector (Table 6.2).

Two coal price scenarios, a low and high projection, were analyzed. Only the scenarios for metallurgical coals will be reviewed here. The low price scenario assumed metallurgical coal prices would remain at contract levels until the end of 1986 with no real increase thereafter. This reduced the net benefits from the NECP to \$197 million, a decline of almost 60% from the central case, and indicated the sensitivity of the project to low prices. The mining and the provincial government sectors sustained losses of \$59 million and \$77

million respectively, the transport and the federal government sectors received net benefits of \$145 million and \$188 million respectively (Table 6.2). The high price scenarios increased the total net benefits of the project from \$464 million under the central case to \$790 million (Table 6.2). The mining and provincial government sectors bore the risks of price variations, experiencing the highest losses under the low price scenario, and the greatest gains under the high price scenario.

The impact of low prices on the financial appraisal was dramatic. Although not explicitly examined in the pre-project report, the net present value of the NECP, excluding social net benefits, was reduced to \$9 million, indicating a very thin margin for error in any of the project's other key parameters. The government's analysts failed to comment on the impact of the low prices and the lower rate of return on the mines' feasibility, and on the overall project's viability. The reader was left to guess whether the mining sector's internal rate of return would be positive at a low price.

The two remaining sensitivity analyses both produced increases in the NECP's net present value. A lower discount rate increased the present value of the NECP's net benefits from \$464 million to \$792 million, and removal of assumed real cost escalations increased the present value of the NECP's net benefits from \$464 million to \$694 million (Table 6.2).

TABLE 6.2
COMPARISON OF RESULTS,
CENTRAL CASE ANALYSIS AND SENSITIVITY ANALYSES:
PRE-PROJECT ANALYSIS
(Millions \$1980C)

	NET BENEFITS (COSTS) BY SECTOR				Total
	Mining	Transport	BC	Canada	
Central Case	\$56	\$145	\$10	\$253	\$464
Expanded Production	151	244	184	406	985
Low Coal Price	(59)	145	(77)	188	197
High Coal Price	193	148	112	337	790
8% Discount Rate	163	213	95	321	792
No Cost Escalation	162	187	57	288	694

Source: BC 1982a, 166.

The pre-project report concluded the NECP represented an "... economically efficient use of both public and private resources." (p. 165) , and would generate net benefits for society, even at a low coal price. However, on closer examination the financial viability of the project, particularly the mining sector, was obviously seriously threatened by lower coal prices.

6.3 THE *EX POST* BENEFIT-COST ANALYSIS

Economic conditions have altered substantially since the late 1970s and the financial viability of the QCL project is now questionable. The results of an *ex post* analysis of the NECP's social benefits and costs are presented in this section. These results identify the relative importance of the project's different variables in the change in economic circumstances surrounding the NECP.

Method, Data Sources and Assumptions

The *ex post* benefit-cost analysis uses the same analytic framework as the pre-project analysis. The same four sectors are established, and the financial viability of the NECP is examined first, followed by a benefit-cost analysis. The distribution of financial and economic benefits and costs among the four sectors is examined.¹¹ In general, the *ex post* analysis uses similar procedures as the pre-project analysis. To maintain consistency between the pre-project and *ex post* analyses, corporate income taxes and mining profits taxes are included as a cost to the mining companies and a benefit to the two governments.¹² The net present value of the socio-economic and environmental externalities are assumed to be the same as suggested in the pre-project analysis; a complete treatment of social benefits and costs in this category is beyond the scope of this work. However, different assumptions and procedures are used to estimate the social opportunity costs of foreign exchange and labour; the assumptions and techniques are explained in detail later in this section. Numerous sources were consulted to formulate estimates of capital costs, operating costs, and revenues for each of the NECP's components. Appendix 6A outlines the available estimates and their sources by component, and documents the assumptions and estimates used in this *ex post* analysis.

11 Year 0 for the *ex post* analysis is set at 1980 to facilitate comparison with the pre-project findings. The *ex post* analysis uses a model developed on Lotus 1-2-3 and an IBM-compatible personal computer. A copy of the model is attached in Appendix 6A.

12 However, under the assumed price scenarios, neither of the mines are expected to pay any corporate income tax or mining profits tax. The capital tax has been discontinued in BC. The port was also expected to pay some corporate income taxes, but two factors led to exclusion of these in the *ex post* analysis. First, the port's ownership was finalized after the pre-project analysis was completed, and 90% is owned by the National Harbours Board, a federal Crown Corporation which pays no income taxes. Second, the potential income taxes due from the private sector participant were expected to be very small and not to begin until far into the future because of the higher-than-expected capital costs of the port.

Two price scenarios are analyzed in the *ex post* analysis. Both use the actual prices received by the mines until the time of the first price review.¹³ Between 1987 and 1991, both scenarios use the prices set by the arbitration panel. After 1991, the competitive prices scenario assumes the price paid to QCL and BOC drops to the long term price trend. This trend is forecast using the price paid to Balmer Mine in 1987 as the starting point and assumes an annual real growth rate of 0.6%.¹⁴ The other scenario, called the contract price scenario, assumes that after 1991 the nominal contract price increases at half the rate of inflation annually,¹⁵ and that the rate of inflation is approximately 5% per year (ECC 1988). Thus the real price declines at approximately 2.5% per year. It is assumed that the real price under this scenario would not go lower than the projected competitive price in any year; if the projected contract price is lower, the competitive price is used in this scenario. The prices assumed under each scenario are presented in Appendix 6A.

The Financial Appraisal

The results of the *ex post* financial analysis, summarized in (Table 6.3), suggest the NECP will yield a net loss to Canada of approximately \$1.16 billion dollars (present value in 1980, 1980\$C). Under both price scenarios, the internal rate of return for the project is negative. The NECP's net present value declines even more when the JSI's losses are included.¹⁶

13 It is assumed that BOC continues to receive the same price in 1987 and 1988 as it did in 1986. Data for these years are not available.

14 The price received by Balmer in 1987 was \$40.04/MT (1980\$C). Using this price as the starting point for the competitive price forecast assumes that prices had returned to the long term trend line in 1987. This assumption is reasonable, as this price is very close to the average price paid for coal exports from Canada to Japan over the past 28 years.

15 This is based on the assumption that the escalator clause in the contract will apply to 50% of the price, as specified in the contracts.

16 The JSI account in the following tables is comprised of the difference between the price paid for metallurgical coal and the competitive market price for similar quality coal. If the equity losses to the JSI were included, the negative value would be larger, and if the debt

TABLE 6.3
NET PRESENT VALUE OF NECP, BY COMPONENT:
EX POST FINANCIAL ANALYSIS*
(Millions of \$1980C)

Project Component	NPV Competitive Price Scenario	NPV Contract Price Scenario
Quintette	(687)	(672)
Bullmoose	(144)	(139)
British Columbia Rail	26	26
Canadian National Rail	36	36
Ridley Island Terminal	(89)	(89)
BC Government	(305)	(304)
Canadian Government	(18)	(18)
Total Canada	(1181)	(1160)
JSI	(489)	(510)

* Year 0 for the *ex post* analysis was set at 1980.

The contract price scenario is the base case for the remainder of this *ex post* analysis, and is used to compare and analyze the differences between the pre-project and *ex post* results. The base cases of the pre-project and *ex post* analyses of the NECP's net present value are presented in Table 6.4.

losses from the Japanese investors and financial institutions were included, the total Japanese losses would be significantly larger.

TABLE 6.4
COMPARISON OF NET PRESENT VALUE OF NECP, BY COMPONENT:
PRE-PROJECT AND *EX POST* ANALYSIS
(Millions of \$1980C)

Project Component	NPV Pre-Project Analysis	NPV <i>Ex post</i> Analysis
Quintette	24.5	(672.0)
Bullmoose	31.5	(139.0)
British Columbia Rail	14.0	26.0
Canadian National Rail	146.0	36.0
Ridley Island Terminal	(15.1)	(89.0)
BC Government	(33.5)	(304.0)
Canadian Government	108.4	(18.0)
Total Canada	275.8	(1160.0)
JSI	N/A	(510.0)

The difference in net present value between the pre-project and *ex post* financial analysis is \$1.436 billion in the Canadian account; it rises to \$1.946 billion when the JSI account is included. Price variations between the two base cases account for a portion of this difference, but do not explain all of it. Four variables are examined to assess their importance in explaining the difference between the pre-project and *ex post* analyses. These variables are; the price received for metallurgical coal, the capital costs of the project, the operating costs of the various components, and the volume of coal sold.

The relative importance of each variable is analyzed using the model developed for the *ex post* analysis. Beginning with the *ex post* base case conditions, each variable is changed to the set of values assumed in the pre-project analysis and the change in project net present value noted. These changes would occur simultaneously in reality, but could only be accomplished incrementally with the model. Consequently, the order of the incremental

changes is varied and the proportion accounted for by each variable in each pattern noted. The results of this analysis for three patterns is presented in Table 6.5, and as expected the proportion of variation accounted for by each variable changed with the pattern. Nevertheless, these results indicate that the capital cost overruns and the price assumptions are the most important elements affecting the pre-project - *ex post* comparison, followed by operating costs and then volumes.

TABLE 6.5
PERCENTAGE OF THE DIFFERENCE BETWEEN THE
PRE-PROJECT AND *EX POST* ANALYSIS
ACCOUNTED FOR BY MAJOR PROJECT VARIABLES

Variable	% of Difference by Pattern		
	1	2	3
Price	34%	34%	34%
Capital Costs	30	38	38
Operating Costs	19	19	23
Volume of Sales	17	9	5

Pattern 1 changed the price first, followed by operating costs, volumes and capital costs. Pattern 2 changed the operating costs first, followed by volume, prices and capital costs. Pattern 3 changed the volume first, followed by operating costs, prices and capital costs. Capital costs were always adjusted last because only a total net present value estimate was available for the pre-project analysis, not an annualized stream.

Overruns in capital costs have had an important impact on the project's financial position. In total, actual capital costs may have exceeded projected capital costs by approximately 50%. All the NECP's components apparently had capital cost overruns, although these were particularly dramatic in the mining sector. The *ex post* estimate of QCL's capital costs exceeded projected costs by more than 40%, and BOC's were 130% greater than estimated in the pre-project analysis. Due to the relative size of the two mines, QCL's overruns accounted for one-third of the NECP's estimated total capital cost overrun.

Together, the two mines accounted for half of the NECP's estimated capital cost overrun (Table 6.6).

TABLE 6.6
DIFFERENCE IN NET PRESENT VALUE OF CAPITAL COSTS,
PRE-PROJECT AND *EX POST* ANALYSIS:
BY PROJECT COMPONENT
(Millions of \$1980C)

Variable	Pre-project	<i>Ex post</i>
QCL	\$451 ^a	\$638
BOC	75 ^a	173
ANZAC	267	355
BCR	50	82
CNR	94	148
PORT	76	177
OTHER INFRASTRUCTURE		
BC	88	101
CANADA	19	18
TOTAL	\$1120	\$1691

^a In the pre-project analysis, on-going capital expenditures were included in the capital cost estimates for the mines. In the *ex post* analysis, these costs were included as part of the mines' operating costs. To compare the pre-project and *ex post* capital cost estimates for the mines, the present value of the mines' on-going capital expenditures was estimated and subtracted from the total capital cost estimate in the pre-project analysis. Carter (1983) estimated the cost of on-going capital expenditures as \$3.09/MT for QCL and \$2.81/MT for BOC (1980\$C), and these were used to adjust the pre-project capital costs.

The price assumed for metallurgical coal was also a major determinant of the difference between the pre-project and *ex post* analyses. The pre-project analysis assumed that the real price of metallurgical coal would reach approximately \$70.00/MT by 1990, and then increase at a real rate of 0.6% annually until the end of the project, reaching \$76.26/MT by 2003. It was assumed that the two mines would receive contract prices until the time of their first price review, and then real price increases would be experienced that would bring the metallurgical coal prices in line with the projected competitive price. The

contract price scenario in the *ex post* analysis assumes the arbitration price for QCL to 1991 and then declining real prices until the competitive price is reached, after which the competitive price is assumed. A similar pattern is assumed for BOC with slight modifications due to the longer fixed price term in the BOC contract. Table 6.7 compares the price assumptions used under the base case scenarios in the pre-project and *ex post* analyses.

TABLE 6.7
ASSUMED METALLURGICAL COAL PRICES
IN BASE CASE SCENARIOS,
PRE-PROJECT AND *EX POST* ANALYSIS
(\$1980C)

Year	Pre-Project		Ex post	
	QCL	BOC	QCL	BOC
1984	\$66.80	\$67.83	\$74.29	\$74.11
1985	65.38	66.54	68.75	68.77
1986	64.19	65.44	67.61	67.76
1987	66.11	64.54	66.33	67.76
1988	68.09	63.81	64.35	67.76
1989	70.14	70.14	60.34	60.34
1990	70.56	70.56	54.53	54.53
1991	70.98	70.98	47.79	47.79
1992	71.41	71.41	46.45	46.45
1993	71.84	71.84	45.02	45.02
1994	72.27	72.27	43.48	43.48
1995	72.70	72.70	42.75	42.75
1996	73.14	73.14	42.43	42.43
1997	73.58	73.58	42.49	42.49
1998	74.02	74.02	42.74	42.74
1999	74.46	74.46	43.00	43.00
2000	74.91	74.91	43.26	43.26
2001	75.36	75.36	43.52	43.52
2002	75.81	75.81	43.78	43.78
2003	76.26	76.26	44.04	44.04

The projected operating costs of the NECP's various components also accounted for a significant portion of the difference between the pre-project and *ex post* financial analyses.

The *ex post* analysis suggests that the projected operating costs in the mining sector were too low (Table 6.8).¹⁷ The mines' off-site transportation costs and royalty payments were not assumed to be any different from the costs used in the pre-project analysis, and so have not been included in Table 6.8.

TABLE 6.8
DIFFERENCE IN OPERATING COST ASSUMPTIONS,
PRE-PROJECT AND *EX POST* ANALYSIS:
BY COMPONENT
(\$1980C/MT)

Component	Pre-Project Projection	Ex post Estimate
QCL		
Capex *	\$3.09	\$4.46
On-site	24.03	31.55
BOC		
Capex	2.81	4.46
On-site	25.81	28.75
BCR	3.09	2.00
CNR	5.39	6.00
PORT	1.18	1.00

* Ongoing Capital Expenditures

The final variable that contributed to the difference between the pre-project and *ex post* analyses is the volume of coal sold. In the pre-project analysis, it was assumed that 6.7 MMTPY of metallurgical and 1.0 MMTPY of thermal coal would be sold from the two mines. This has not been the case to date. QCL experienced start-up delays and did not produce or sell as much coal as expected during the first few years of operation, and

¹⁷ The pre-project operating cost estimates were obtained from BC (1982a). That document did not provide operating costs per metric tonne, but did provide the sum of operating costs (in constant dollars) over the twenty year period; divided by the total production yields a unit estimate of operating costs. However, for QCL the metallurgical and thermal costs were aggregated, and the pre-project estimate in Table 6.8 is an average; the operating costs for metallurgical coal would be slightly higher than this, perhaps coming closer to the BOC estimate.

production of thermal coal for export was suspended in 1986 (Horie 1988). Both mines have been selling the minimum contract volumes to the Japanese steel mills since 1986. To analyze the impact of full volumes on the difference between the pre-project and *ex post* analysis, it was assumed that 7.7 MMTPY of metallurgical coal was sold to the Japanese mills. By assuming the total volume sold was metallurgical, rather than providing for some thermal coal sales, the total revenues received by the mines is overstated, and the mines' net revenues and the provincial government's royalties may also be overstated. However, estimating thermal coal prices and production costs is beyond the scope of this research.

TABLE 6.9
DIFFERENCE IN VOLUME ASSUMPTIONS:
PRE-PROJECT AND *EX POST* ANALYSES
(MMTPY)

	Pre-Project	<i>Ex post</i>
QCL		
1983	0.48	0.336
1984	4.8	3.376
1985	6.0	4.907
1986-2003	6.0	4.75
BOC		
1983	0	0.406
1984	1.7	2.010
1985	1.7	1.896
1986-2003	1.7	1.615

Sources: Pre-project, (BC 1982a); *Ex post* (Horie 1988)

To briefly summarize, the pre-project financial analysis indicated the NECP's net present value would be \$275.8 million. The *ex post* analysis suggests that, in fact, the NECP's net present value may be in the order of negative \$1.16 billion on the Canadian account, increasing to negative \$1.67 billion if the JSI account is included. The major variables

accounting for the variation between the pre-project and *ex post* analyses are: a large variation between projected and actual capital costs, a significant discrepancy between expected and actual prices, and an important difference between projected and actual operating costs in the mining sector.

This variation between the pre-project and *ex post* financial analyses is extremely important to the future viability of the NECP. The higher capital and operating costs of the mining sector, combined with the lower prices, seriously threaten the financial viability of the mines. The other infrastructure investments hinge on the mines; if the mines close, the NECP mega-project may fail. This *ex post* analysis raises serious questions about the adequacy of the pre-project analysis of costs and prices in coal mining.

The Benefit-Cost Analysis

The pre-project financial analysis of the NECP was adjusted to reflect social benefits and costs associated with the NECP. The major categories of adjustments were: 1) market distortions affecting project inputs or outputs, and 2) externalities caused by the project. The major market distortions identified were in the areas of labour inputs and foreign exchange effects. The externalities considered were divided into socio-economic and environmental categories.

The largest social adjustments in the pre-project analysis occurred through the use of shadow prices for foreign exchange and labour. The social opportunity costs of these variables were estimated to generate benefits with net present values of \$133 million in the foreign exchange category and \$50 million in the labour category. These adjustments increased the net present value of the NECP to \$463.8 million from \$275.6 million, and placed the government sectors in a significantly improved position. The net present value

of the BC government sector increased from a negative position of -\$33.5 million to a positive value of \$9.5 million, and the Canada government sector's net present value increased from \$108.2 million to \$253.4 million.

The *ex post* analysis focuses on the two factors that accounted for the majority of the pre-project social adjustments, foreign exchange and labour benefits.¹⁸

The pre-project analysis estimated that the net social benefit of foreign exchange earnings related to the NECP was \$133 million, which represented approximately 71% of the economic adjustments made in the pre-project analysis. It assumed the social opportunity cost of foreign exchange was equal to a premium of 8% over the market exchange rate, an estimate based on research by Jenkins and Kuo in the 1970s. In the early 1970s, Jenkins and Kuo estimated the social opportunity cost of foreign exchange was 13% to 15% higher than the market exchange rate, but by the late 1970s they had reduced their estimate to an 8% premium. By the mid-1980s, their estimate had declined again to 6.5% (Jenkins and Kuo 1985), and this would have reduced the NECP's estimated foreign exchange benefit to approximately \$108 million. However, the Free Trade Agreement (FTA) between Canada and the United States raises the question of whether it is appropriate to assume that the social opportunity cost of foreign exchange is different from the market exchange rate. The shadow price for foreign exchange is strongly influenced by tariffs, and under the FTA tariffs with Canada's major trading partner will be enormously reduced. Thus, the contribution of this component to the social opportunity cost of foreign exchange will be significantly reduced. Agencies such as the National Energy Board have considered foreign exchange benefits so dubious that they have prohibited them from being

¹⁸ The adjustments in the other two categories are assumed to be the same as in the pre-project analysis.

used in benefit-cost assessments of energy exports (NEB 1985, 29).¹⁹ Thus, the *ex post* analysis of the NECP has excluded this variable from consideration.

The second major component of the economic adjustments in the pre-project analysis was in the social opportunity cost of labour. The pre-project analysis assumed that approximately 10% of the labour for the operating phase of the NECP would be drawn from the pool of unemployed or underemployed workers, and thus the social opportunity cost of employing these individuals was less than the market wage rate. The difference between the market wages paid and the social opportunity cost of the labour was designated as a social benefit, and estimated to have a net present value of \$50 million. However, economic conditions during the 1980s were significantly different than anticipated when the studies on a shadow price for NECP labour were completed. Unemployment rates were very high during the early 1980s, particularly in the construction and primary industries, suggesting that the NECP generated significant labour benefits during the construction phase and during the early years of the operation phase.

To estimate the actual labour benefits associated with the NECP, the method proposed by Havemann and Krutilla (1968) is used. Havemann and Krutilla argued that in a fully employed economy, the opportunity cost of labour is equal to the market wage rate, and in an idle economy the opportunity cost is zero. In an intermediate economy, the opportunity cost is a function of the probability of drawing labour from the idle group. Havemann and Krutilla developed three labour response functions, an upper, lower and best estimate, that

¹⁹ Discussions with government officials and consultants suggested that shadow pricing foreign exchange is not done in practice. Discussions on current 'rules-of-thumb' for shadow-pricing in benefit-cost analyses were held with Dr. M. Shaffer of Shaffer and Associates in WhiteRock, BC, Mr. J. Hulstein of the Department of Western Diversification, Dr. B. Anderson of Industry, Science and Technology Canada, Dr. S. O'Dell, Deputy Director General of Economic and Financial Analysis Branch of Energy Mines and Resources Canada, and Mr. J. Champion of BC's Ministry of Regional and Economic Development.

related the probability of hiring an unemployed worker to the unemployment rate. The curves were actually bands comprised of the labour response curves for the major occupational categories. The bands' intercepts on the abscissa ranged between 1% and 7.5%, as the curves were based on data for the US economy during the early 1950s, a time of low national unemployment. Havemann and Krutilla's best estimate curve suggested that at an unemployment rate of 6% to 7%, approximately 5% of the work force for a proposed project would come from the pool of idle workers.²⁰ Thus the social opportunity cost of the labour employed in such a project would be 95% of the wage bill. This could be entered in a benefit-cost analysis as lower costs or as an additional benefit.

In this analysis, the labour benefits in the construction and operating phase of the NECP are estimated separately. The operating phase is restricted to the 1983 to 1989 period as the national unemployment rate in the mining industry was 6.8% in 1989 and the probability of hiring an otherwise unemployed person was low. Should the unemployment rate in the mining industry remain low until 2003, the additional labour benefits generated by the NECP will not increase the net present value of this component significantly.

The annual labour benefit associated with the NECP is estimated as follows:

- 1) estimate the number of person-years of employment in each year of the construction and operating phases, up until 1989,
- 2) estimate the probability of hiring a previously unemployed construction or mining worker during each of these years by using the best-estimate labour response function developed by Havemann and Krutilla,²¹

²⁰ This assumes no geographic or institutional constraints.

²¹ Havemann and Krutilla's labour-response functions are occupation, not industry, specific. The actual occupational categories of construction and operating phase jobs were not obtained for the *ex post* analysis, and so it is assumed that the mid-point of the range in the labour-response function is a reasonable industry estimate.

- 3) estimate the number of person-years of construction and operating employment that would be filled by otherwise unemployed workers,
- 4) estimate the average wage for a person-year of employment in the construction and mining industry for each year,
- 5) place the full value of the otherwise-unemployed workers' wages into the labour benefit category, and
- 6) discount the labour benefit to 1980 using a discount rate of 10%.

The number of person-years of employment in the construction and operating phases was obtained from a government study (BC 1981c), through personal interviews with the two mines, and other published sources (Shera et al. 1987; Shera and Gill 1987). Unemployment rates by industry were obtained from the Statistics Canada publication, Labour Force Annual Averages (Catalogue #72-529); the provincial unemployment rate is used for the construction industry, but the national unemployment rate is used for the mining industry.²² The average wage in the construction industry in each year was obtained from the Statistics Canada series, Employment, Hours, and Earnings, Catalogue #72-002. For the mining industry, the average wage was estimated from the payroll and employment estimates provided by mine management. Havemann and Krutilla's (1968) best and low labour response functions are used to provide a range in the probabilities of hiring an otherwise unemployed worker. It is assumed that the social opportunity cost of unemployed labour is equal to zero. This assumption is not theoretically correct and the value should at a minimum be set equal to the value of leisure time (Sugden and Williams 1978). Thus the estimated labour benefits are maximum values. This technique is not as rigorous as the one proposed by Jenkins and Kuo (1978), which was apparently used in

²² Labour in the mining industry was assumed to be nationally mobile. This is reasonable given information on the origins of employees at the two mines. This information was obtained from specially-ordered cross-tabulations of Statistics Canada Census information, and from personal interviews with mine management and employees. Labour in the construction industry was assumed to be primarily obtained from the province, because of the provincial basis of unions in this industry.

DREE's estimate of labour benefits. Thus the estimates in this *ex post* analysis should be viewed as order-of-magnitude estimates.²³

The net present value for the labour benefits generated during the construction phase is estimated to be between \$180 million and \$200 million; for the operating phase to the end of 1989 the net present value is estimated to be between \$20 million and \$40 million. The lower estimates in each case, based on Havemann and Krutilla's (1968) low labour response function, may be preferable for two reasons. First, Havemann and Krutilla's functions are based on data for the United States in 1953, when the economy was fully employed and structural unemployment was only 2.5%. Since that time, structural unemployment has increased. The impact of this would be to shift the labour response functions' intercepts on the abscissa, and the curves, to the right. Thus, for a given unemployment rate, the probability of hiring an otherwise unemployed person would decline.²⁴ Second, the social opportunity cost of the unemployed labour has been assigned a value of 0, which is theoretically incorrect. The underestimation of the social opportunity cost results in an overestimation of the labour benefit. Table 6.10 presents the economic adjustments made in the pre-project and *ex post* analyses.

23 Based on discussions with practicing economists, it appears that a shadow price for labour, and a resulting labour benefit, is often estimated using a similar technique, but only included in the benefit-cost analysis as a sensitivity analysis. Using this approach, the shadow price does not affect the base case analysis, or the investment decision.

24 If the level of structural unemployment is assumed to equal 6%, and Havemann and Krutilla's best curve is shifted to the right so that its average intercept is approximately 6%, the estimated present value of the labour benefit in the NECP's construction phase is \$181.3 million, and in the operation phase it is \$12.4 million.

TABLE 6.10
ECONOMIC ADJUSTMENTS IN THE
PRE-PROJECT AND *EX POST* BENEFIT-COST ANALYSES
(\$1980C)

Category	Net Present Value	
	Pre-Project	<i>Ex Post</i>
Labour	\$50.0	\$200.0
Foreign Exchange	133.0	0.0
Social & Socio-economic	N/A	N/A
Resource Use & Environmental	5.0	5.0
Total	\$188.0	205.0

Source: Pre-project estimates - BC 1982a, 144.

Table 6.11 shows the net present value of the base cases in the pre-project and *ex post* analyses after the economic adjustments were made.

TABLE 6.11
NET PRESENT VALUE OF THE NECP,
PRE-PROJECT AND *EX POST* ANALYSIS
INCLUDING ECONOMIC ADJUSTMENTS:
BY PROJECT COMPONENT
(Millions of \$1980C)

Project Component	Pre-Project	<i>Ex post</i>
QCL	\$24.5	(672)
BOC	31.5	(139)
BCR	14.0	26
CNR	146.0	36
PORT	(15.1)	(89)
BC	9.5	(199)
CANADA	253.4	82
TOTAL	463.8	(955)
JSI	N/A	(510)

The *ex post* benefit-cost analysis strongly suggests the NECP was not a socially efficient use of public funds. Even considering a shadow price for labour, the BC government account remains far from meeting the minimum test of generating a positive return at a discount rate of 10%. Given the contract price scenario, the two mines do not generate positive internal rates of return, and thus should not be expected to continue operating without subsidies from the provincial and federal governments, or without continuing subsidization by the JSI in the form of a higher price.

6.4 EVALUATION OF THE PRE-PROJECT ANALYSIS

The *ex post* analysis of the NECP indicates that the project resulted in a significant loss in social welfare. This analysis is based on hindsight information which was not available to the NECP planners. Therefore it is unfair to criticize the pre-project analysis by using hindsight information. The key question in evaluating the pre-project assessment is whether the analysis was reasonable based on the information available at the time. The following discussion addresses this issue, first by examining the methodological adequacy of the pre-project analysis, and then the reasonableness of the assumptions it employed.

The methodological approach used in the pre-project analysis skewed the distribution of net benefits to favour the government sectors, and may have caused an upward bias in the NECP's net present value. The skew was caused by the inclusion of corporate income taxes, mining profits taxes, and capital taxes as an incremental benefit to the governments specifically due to the NECP. However, the pre-project analysis used a social discount rate of 10% to estimate the opportunity cost of capital, and this includes a return to private capital plus tax payments to the government. Using this social discount rate assumes that if the capital was not invested in the NECP, it would be invested elsewhere in the

economy, generating corporate income tax revenue. To include corporate income tax revenue as an incremental benefit to government, therefore, is incorrect. The only tax revenue which could be viewed as an incremental gain is revenue above that normally paid, which in the case of the NECP is nil. Indeed, this is the approach used on the cost side in the pre-project analysis in which only "special" costs such as railway lines are included while normal costs such as schools, policing and general costs associated with accommodating economic growth are ignored.²⁵

The Province's Guidelines for Benefit-Cost Analysis (BC 1977b) are clear regarding the treatment of taxes in benefit-cost analysis.

Frequently, governments tend to view increased tax revenue as benefits of a proposed development project. ... While taxes represent an important source of revenue for most governments, financial flows in the form of increased tax revenues do not represent real flows and in particular should not be accounted among the benefits of a project. ... opportunity costs and opportunity returns are the fundamental concepts which determine whether particular items are benefits or costs ... If we apply the opportunity cost standard to tax payments, it is immediately clear that such payments are not opportunity costs from society's viewpoint. Tax payments do not represent a claim on society's real resources. ... tax payments should not enter directly into the benefit-cost analysis ... (BC 1977b, 124).

The pre-project benefit-cost analysis included corporate income taxes as a cost to the companies and a benefit to the government, and this skewed the distribution of net benefits to favour the government sectors. Correcting for this mistake in the pre-project analysis suggests that the BC government was not making a socially efficient use of public funds by investing in the NECP (Table 6.12).

²⁵ The pre-project analysis argued that indirect taxes related to the NECP would cover these costs.

TABLE 6.12
 DISTRIBUTION OF NET BENEFITS,
 INCLUSIVE AND EXCLUSIVE OF CORPORATE INCOME TAX PAYMENTS:
 PRE-PROJECT ANALYSIS
 (Millions of 1980\$C)

Sector	Including Tax Payments	Excluding Tax Payments
Mining	56.0	323.8
Transport	145.0	160.7
BC	10.0	(139.5)
Canada	253.0	119.0
Total	464.0	464.0

Source: BC 1982a.

The methods used in the pre-project analysis to estimate the social opportunity costs of labour and foreign exchange may have led to an overestimate of the NECP's net benefits. It is difficult to assess the techniques and assumptions employed in the pre-project analysis as little information is provided in the report itself and the background studies are unpublished government documents. However, if the social opportunity costs of labour and foreign exchange were assumed to remain constant over the period of analysis (1981 to 2003), this was inappropriate. The pre-project analysis assumed that a social benefit would be generated during the operating phase by employing workers who would otherwise have been unemployed or employed elsewhere at a lower wage. It is unreasonable to assume that the unemployed workers would have remained unemployed for the entire operational period of 20 years, and if the pre-project analysis did this, the social benefits would have been overestimated. Similarly, assuming that the social opportunity cost of foreign exchange would remain the same over the period of analysis would have been unreasonable given the declines in the estimates that were observed by the analysts, and indications that trade barriers would continue to decline in the future through the

implementation of the General Agreement on Tariffs and Trade. If the pre-project analysis was based on these assumptions, the NECP's estimated net benefits were overestimated. Given the debate on these issues, these benefits should not have been included in the central case, but only as a sensitivity analysis.

An additional factor that may have caused an overestimate of the NECP's net benefits was the pre-project analysis of externalities and non-marketed commodities. A conceptual discussion of many of the NECP's potential externalities was presented, but the translation of these externalities into monetary values that could then be used in the benefit-cost analysis was cursory. Despite allocating considerable resources to identification of environmental and socio-economic impacts in the planning process, the information provided in these studies apparently did not allow the economic analysts to place values on these impacts.²⁶ In addition to the inadequate valuation, several important issues, such as the loss of wilderness area, were not identified as potential impacts and were excluded from the benefit-cost analysis.

A final methodological criticism of the pre-project analysis is that it did not compare the NECP to another alternative, and so was inconsistent with the Province's guidelines for conducting benefit-cost analyses, as the following quote demonstrates.

... benefit-cost analysis is a comparative technique. This view of the technique is of utmost importance and it cannot be stressed enough. The excess of social benefits over social costs or a benefit-cost ratio greater than 1.0 is a necessary but not sufficient condition for projects to pass the efficiency test. The above conditions define a socially profitable project but do not insure that the project represents the least cost means of achieving the stated objectives. This latter condition can be met only by a thorough review and comparison of alternatives. (BC 1977b, 12; emphasis in original).

²⁶ The report on wildlife impacts (BC 1977a) did assign values to the expected impacts. However, the pre-project analysis regarded these estimates sceptically and adopted more conservative values for the social costs of negative impacts on wildlife.

A comprehensive evaluation of the NECP in the spirit of the provincial guidelines was not completed. The benefit-cost analysis estimated the NECP's total net benefits and their distribution, but it did not evaluate the NECP's social efficiency. Alternative means for achieving the Province's goals of provincial and regional economic development were not considered. Instead, the analysis of alternatives was restricted to variations within the NECP's components.

The NECP should have been compared to increased production from mines in southeastern BC. The southeast can supply metallurgical coal at a lower cost than the northeast. Barnett (1985) estimated that new production from the southeast would cost \$57.82/MT (1980\$C), compared to \$63.39/MT for BOC and \$80.40/MT for QCL. Additional supply from the southeast would have occurred in smaller projects. These are less 'lumpy' than the northeast mines and so are more flexible and socially less risky. Two other elements would have contributed to lower risks; the area was already known, geologically, and the mine operators were experienced. In a comparative benefit-cost analysis, the lower costs and lower risks of supply from the southeast would have called the social inefficiency of the NECP into question.²⁷

In addition to these methodological criticisms of the pre-project analysis, the *ex post* analysis suggested that a number of the assumptions made in the pre-project analysis have proved incorrect. We now turn to an assessment of whether those assumptions were reasonable given the information available at the time.

²⁷ Nor was the NECP compared to a number of other regional development projects for the Peace River area, such as an ethanol plant, value-added forestry projects, or establishment of a northern university.

Project Cost Assumptions

Capital and operating costs were underestimated in the pre-project analysis of the NECP. The net present value of total capital costs were placed at \$1.120 billion; the actual capital costs were estimated to be \$1.691 billion, an overrun of 51%. Almost one-third of the total capital cost overrun was accounted for by QCL, followed by the port (17.66%), BOC (17.16%), and the Anzac spur line (15.32%). The capital costs of the mines, railways and port represented 90% of the projected capital costs for the NECP, and the overruns in these components accounted for 98% of the total capital cost overruns.

The pre-project approach to projecting the NECP's capital costs varied by project component. Denison Mines Limited and Teck Corporation supplied background cost data for QCL and BOC, respectively, to the provincial government (BC 1982a, 66-67). This information was used in a financial model, COALMOD, developed specifically for coal mining operations in BC. COALMOD can take technical data on coal seam thickness, mining techniques, equipment and labour requirements, and coal prices, and generate a discounted cash flow analysis for the coal mining operation. Or, capital and operating cost estimates from the proponent's feasibility analyses of the coal property can be used to estimate the stream of costs and revenues, bypassing COALMOD's technical component. In the NECP case, the analysts relied on the information supplied by the two mining companies on capital and operating costs (BC 1982a, 65), and did not utilize the technical component of COALMOD. While this information changed in later feasibility studies, the initial estimates were retained in the pre-project analysis.

Transport sector costs were provided by consulting engineering firms. The railway capital costs, including the cost of constructing the Anzac spur line, upgrading costs for the BCR and the CNR, and the purchase of rolling stock, were provided by a specialized

engineering firm, Swan Wooster Engineering Co. Ltd., after several highly-detailed investigations. Research on a number of railway access options began in 1976, using a rail systems model (ROCM) to detail capital and operating costs of the options. Investigation of the options continued for three years as the potential participants in the mining development continued to shift. In 1980, when it appeared that BOC and QCL would be the first mines to go into production, the analysis of various access routes was undertaken once again. Because the analysts believed that the Monkman property had a good probability of obtaining production contracts (BC 1982a, 75), the potential output from this mine was incorporated in the rail system analysis. The analysis showed a slight preference for the Anzac route, and the ROCM was used to estimate final capital and operating costs for this option. For the port, capital and operating costs were prepared by a another consulting engineering firm (Wright Engineers Ltd.). BC's Ministry of Industry and Small Business Development built a port financial model (PORT) which used this information in a cash flow analysis of the coal terminal.

On the operating cost side, limited data is publicly available regarding the actual operating costs of the rail and port systems, and the mines. However, published operating cost estimates that were made after start-up (see Appendix 6A), suggest that the mines' actual operating costs are higher than the pre-project projections. QCL's operating costs (including on-going capital expenditures) may be 33% higher than projected,²⁸ and BOC's may be 16% higher. Once again, the pre-project estimates used in the benefit-cost analysis of the NECP were provided by the mine developers; the pre-project analysts apparently accepted these estimates on faith. They did not verify the projected costs with the COALMOD, nor did they revise the costs when the developers later submitted feasibility analyses of the mining operations that contained different cost estimates.

²⁸ The pre-project estimate of QCL's operating costs is an average of operating costs for the metallurgical and thermal coal production; the cost estimates for metallurgical production would be slightly higher than the average.

The potential for significant capital cost overruns or higher operating costs was not considered in the base case analysis, nor in the sensitivity analyses of the NECP. Yet, there are several reasons why these risks should have been expected. First, the northeast coal deposits were located in a completely new mining area. Before the flurry of exploration in the 1970s, very little resource development activity had taken place in the region. It was used for hunting, trapping, wilderness recreation, and some natural gas exploration and export. No large-scale open-pit mining had been attempted. The lack of knowledge about the area raised the level of uncertainty regarding the geology and the coal seam structure. These issues were addressed inadequately in the exploration and mine planning stages, particularly for the QCL mine. BC's Chief Geologist, after leaving the government's staff, stated that the amount of drilling completed on the QCL project in the exploration phase was inadequate, and that he had warned the NECP planners and the mine management of the potential implications of this inadequacy (Globe and Mail, 9/5/85). These uncertainties were not reflected in the benefit-cost analysis; no risk assessment was completed. The ex-Chief Geologist's concerns were borne out; QCL was forced to open a new pit in 1986 to meet production targets. The fractured coal seams and high level of ash in the existing pits were preventing QCL from meeting its planned output levels and operating costs.

Second, neither of the mine development companies, Denison or Teck, had previous coal mining experience. Prior to the QCL undertaking, Denison was primarily a uranium mining company with its major operation at Elliott Lake in northern Saskatchewan. Most of the uranium output was sold under contract to Ontario Hydro on a cost-plus pricing arrangement. This contract had contributed substantial net revenues to Denison, and the company was looking for other investments in the 1970s. Following the corporate diversification trend prevalent at that time, Denison invested in coal mining in

northeastern BC, potash mining in New Brunswick, and oil and gas operations off the shore of Greece, despite the fact that the company's background did not include experience in any of these resource commodities. Teck Corporation's mining experience was primarily in metal mining in southern BC.

Third, two previous experiences with large coal mining expansions in western Canada had capital cost overruns. When Kaiser Resources Ltd. began coal mining in the East Kootenays, its estimated capital costs were \$90 million; the final investment was \$170 million, representing an overrun of 89% (Sun, 27/10/76). Gunton (1981, 18) noted that initial design errors in the Kaiser mine led to a number of start-up problems and higher capital costs. The accumulated losses resulting from these errors were approximately \$35 million by 1972. The Porcupine mine at Grande Cache, Alberta also had significant capital cost overruns. The Alberta government supported the development of a coal mine in a previously unexploited region by building a rail line into Grande Cache, and by assisting the mine developer to build a new town. After a number of difficult years, the mining company closed one of the mines it was operating and released 206 employees. The public outcry and the provincial government's close association with the project led to establishment of a Royal Commission to examine the factors that led specifically to the mining company's actions, and generally to the failure of this resource project. Headed by N.R. Crump, the Commission noted that the mining company's costs were much higher than expected due to technical problems and the difficulties of recruiting and training mining personnel (Crump 1973, 34).²⁹ The technical problems were caused by inadequate information prior to start-up on the area's geology, which resulted in the company never reaching contracted production levels, despite continual changes in technology and

²⁹ The Crump Commission also noted that a major factor contributing to the difficulties of the Grande Cache coal project was the previous inexperience of the mining company with coal mining. Apparently, this was not considered to be a serious problem by the Alberta government, as an independent analysis of the company's geological and economic feasibility analyses was not undertaken.

additional capital investment. Several mines were abandoned when the company changed its mining technology from underground to open-pit, and the equipment suited to the old mining technology was also abandoned. The total mining investment was \$104 million; total losses stood at \$80 million in 1972, and the mining company itself had lost \$22 million (Crump 1973, 34-45, 70). The Commissioners concluded that, among other things, the government's failure to evaluate the mining company's feasibility analyses, the company's inexperience in coal mining operations, and the tremendous uncertainty regarding the area's geology, underground mining technology and labour availability contributed strongly to the failure of this project. In the words of the Commissioners,

All parties were optimistic about the project and there was certainty in the minds of all the parties that a large scale coal operation would develop... (Crump 1973, 12).

These directly-related experiences in coal mining expansions in western Canada should have injected some caution into the planning process for the NECP, and into the evaluation of the mega-project. Yet, nowhere in the planning documents is any mention of these parallel experiences found.

Fourth, there were warnings from independent sources, mostly outside the planning process, regarding the risks of the project and the potential for capital cost overruns. Livernois's (1980) preliminary analysis of the NECP's economic viability included the potential of a 20% over-run in total capital costs. Halvorson (1980a) argued that a lower-cost, lower-risk, option available for the NECP's infrastructure investment was to encourage the development of the BOC and Sukunka projects first and use trucks to transport the coal to Chetwynd, and the existing BCR rail line to transport the coal from Chetwynd to North Vancouver, where ports might require some additional, but relatively low cost, upgrading to handle the additional traffic. When the market justified development of the QCL property a rail line from Chetwynd and a new town could be built.

A final reason why cost overruns should have been anticipated is that evidence from other large projects suggests that cost overruns are endemic to such undertakings. The report of the Royal Commission on the British Columbia Railway (McKenzie 1977) noted that huge capital cost overruns had been incurred on that railway's Dease Lake extension, to the point where the extension had to be abandoned, incomplete. Hall's analysis of a number of large projects showed that cost escalations were a common problem that transformed large projects into 'great planning disasters' (Hall 1980, 6-8). Three of the five case studies analyzed by Hall were large public investment projects that had been implemented; for each, a long period of time elapsed between when these projects initially appeared in the public eye and when they were actually completed. Initial cost estimates for the three implemented projects (and for one of the non-implemented projects) were substantial, yet were continually revised upwards during the planning process. Total capital costs incurred when the projects were finally completed, between 11 and 16 years after the original capital cost estimate was put forward, were orders-of-magnitude larger than the original estimates (Table 6.13). Interestingly, the decisions to proceed with these projects were often taken based on the early cost estimates and not revised even when later feasibility studies reported higher capital cost estimates.

TABLE 6.13
CAPITAL COSTS, INITIAL ESTIMATES VERSUS ACTUAL:
SELECTED LARGE PUBLIC INVESTMENT PROJECTS

Project	Estimated Cost	Final Cost
Anglo-French Concorde	150-170 million pounds (1962)	1,065 million pounds (1973)
Bay Area Rapid Transit San Francisco, USA	586-716 million \$US (1956)	1,600 million \$US (1974)
Opera House Sydney, Australia	7 million \$A (1957)	102 million \$A (1973)

Source: Hall (1980)

Given the evidence available at the time, the only conclusion possible is that the pre-project analysis of the NECP was not prudent or reasonable in its treatment of the project's costs. The government's analysts took the mining capital cost estimates on faith despite the companies' lack of previous experience in coal mining, did not run independent analyses of mining costs, ignored previous experience with coal mining expansions in western Canada, ignored or did not seek out information on other large public investment projects, and ignored the risks of mining in a totally new area of the province. At the very minimum, the pre-project benefit-cost analysis should have included significantly higher costs in the sensitivity analyses of the project; this was not done, and in fact the analysis only examined the impact of lower capital costs on the project's feasibility. Actual capital costs exceeded pre-project estimates by 50%, and this difference accounts for the major proportion of the variation between the pre-project and ex post financial appraisal.

Project Revenue Assumptions

Assumptions in the pre-project analysis regarding revenues from coal sales have not been borne out. Revenues depended on the projections of prices and sales volume. The *ex post* analysis suggested that the variation in prices will have a more significant impact on the project's feasibility than the volume, and so it is to the assumptions and analysis that informed the pre-project price projections that this review now turns. The scope of this review is restricted to the market analysis for metallurgical coal; it was the largest component of the coal to be sold from the northeast mines, and has been the only type of coal sold since 1986. However, the metallurgical and thermal coal markets are linked as lower quality metallurgical coals and higher quality thermal coals can shift into either market. The pre-project price projections for metallurgical coal were apparently based on the government's assessment of future demand and supply dynamics in the metallurgical coal market, focussing on the Pacific Rim trade. In this review, the demand side assumptions will be examined first, followed by the supply side and then the price assumptions.

The importance of future demand for metallurgical coal to the NECP's economic feasibility was clearly recognized in the government's analysis.

Substantial infrastructure investment is required for the proposed coal developments. Since the success of this investment depends on coal sales, *the quantity which North East coal producers can sell on a firm basis and the prices they can command become matters of cardinal importance in project evaluation.* (BC 1982a, 16; emphasis added).

Canadian markets for metallurgical coal are limited, and so a positive benefit-cost analysis of the NECP depended on the nature of future export markets, especially in Japan. Again, the pre-project analysis recognized this.

Only the Japanese steel industry, which accounts for almost 50% of world coking coal imports, could offer the size of contracts necessary to open up a new coal supply area such

as North East British Columbia. Furthermore, this was perhaps a unique opportunity, which may not exist again for many years when the many factors affecting coking coal supply and demand ... came together to produce a large volume sales opportunity in a reliable market such as Japan. It is really this market opportunity which forms the basis of the benefit-cost analysis in this report. (BC 1982a, 26).

Japanese crude steel production expanded from 51.9 MMT in 1966 to 120 MMT in 1973, a compound annual growth rate of 12.7% per year. In the mid-1970s, the JSI was forecasting that its crude steel production would reach 170 MMT by 1985. During the latter part of the 1970s, this forecast was gradually reduced; by the early 1980s, the JSI expected to produce between 123 and 128 MMT of crude steel in 1985, and between 135 and 137 MMT by 1990 (BC 1982a, 19-22). In 1980, the government's analysts forecast JSI production levels would be 132 MMT in 1985 and 145 MMT in 1990, but revised this to 125 MMT in 1985 and 135 MMT in 1990 before completing the benefit-cost analysis.

The analysts transformed their forecast of Japanese crude steel production into a metallurgical coal demand forecast by applying an assumed ratio of metallurgical coal input:crude steel output. This ratio was significantly higher than Japanese practice at the time, and assumed a reversal in the trend to increasing the amount of oil injected into blast furnaces. This was justified by reference to rising oil prices, and to "recent discussions and analysis during late 1980 and early 1981" (BC 1982a, 22). The ratio assumed in the pre-project analysis was 640 kilograms of metallurgical coal per tonne of crude steel in 1985.³⁰ For the forecast steel production of 125 MMT in 1985 and 135 MMT in 1990, the analysts estimated metallurgical coal import requirements would be 80 MMT and 86 MMT, respectively. The projection of Japanese demand for metallurgical coal imports was

³⁰ That actual ratio was actually somewhat less, closer to 620 kilograms per tonne of crude steel.

then included in a forecast of global import levels which were projected to reach 170 MMT in 1985, and 198 MMT in 1990.

The JSI's enormous expansion of the late 1960s and early 1970s was not sustained after 1973 (Table 6.14). In 1985, Japanese crude steel production and metallurgical coal imports were 17% and 23% lower than the government had projected, respectively. An important Japanese trade publication suggested that thermal coal markets had reached rock bottom in 1987, but reported a high level of uncertainty regarding the future of the metallurgical coal market (Horie 1988, preface). Thus it is highly uncertain, and probably unlikely, that crude steel production in Japan will have expanded by 1990 to 135 MMT, as forecast in the pre-project analysis.

TABLE 6.14
JAPANESE CRUDE STEEL PRODUCTION
AND METALLURGICAL COAL IMPORTS,
1974 - 1986

Year	Steel Production (MMT)	Met. Coal Imports (MMT)
1974	114.0	57.9
1975	101.6	56.9
1976	108.3	56.8
1977	100.7	54.2
1978	105.1	49.0
1979	113.0	53.4
1980	107.4	58.5
1981	103.0	60.2
1982	96.3	56.4
1983	100.2	56.4
1984	106.5	60.8
1985	103.8	61.6
1986	96.4	56.7

Source: Horie 1988.

The pre-project demand forecast for Japanese metallurgical coal imports incorporated the declining expectations of the late 1970s regarding future crude steel production in Japan. However, there were strong indications that the expectations should have been adjusted even further downwards. The background reports that were commissioned for, or available to, the NECP planning process,³¹ exhibited a chronological pattern of declining expectations regarding Japanese demand. In the mid-1970s, the report of the BC Coal Task Force (BC 1976a) assumed that Japanese steel-making capacity would continue to increase until the late 1980s, reaching 176 MMT in 1985 and 190 MMT in 1990. The corresponding estimate of metallurgical coal import requirement for 1985 was 105 MMT. Over the latter half of the 1970s this early optimism dissipated and Japanese import requirements were reduced to 85 MMT (Stanford Research Institute 1978), and then to a range of 70 to 76 MMT (Jones and Sivertson 1979; Patching et al. 1980; WOCOL 1980; Robinson Dames and Moore 1980) (Table 6.15).

³¹ These reports are summarized in Appendix 6B.

TABLE 6.15
PROJECTIONS OF JAPANESE METALLURGICAL COAL IMPORTS,
COMPARED TO PRE-PROJECT PROJECTION

Study	Import Projection (1985) (MMT)
Stanford Research Institute (1978)	69
Jones and Sivertson (1979)	62 - 68
Patching et al. (1980)	70
WOCOL (1980)	73 - 76
Institute for Energy Economics (1981)	71.5
Pre-Project Analysis (1982)	80

Source: BC 1982a, 21-25.

The lower projections in the background reports were based on observed structural shifts in the Japanese economy in general, and its steel industry in particular. These analyses suggested lower levels of Japanese metallurgical coal imports would be caused by four important factors; stabilizing domestic steel consumption, declining steel exports, changing technology in coke-making, and increasing environmental and land-use conflicts in Japan. Lower domestic consumption of steel was tied to a decline in shipbuilding between 1973 and 1977, slow growth in the auto industry, and slackening private equipment investment (Jones and Sivertson 1979). Lower steel exports were related to competition from the newly industrializing countries, import restrictions in major markets, and the appreciation of the Japanese yen (Stanford Research Institute 1978). The process of briquetting in

coke-making expanded the range of coals that could be used to make coke, thus lessening the demand for higher-quality metallurgical coals. Briquetting also reduced the growth potential of prices for high-quality metallurgical coals (RTNAS 1978). In addition, the world steel industry was undergoing a global reallocation of productive capacity in the late 1970s. Countries in the Eastern Bloc, newly industrializing areas, and the 'third world' were increasing their productive capacity, and a concomitant decline was being experienced in North America, the European Economic Community and Japan (Patching et al. 1980, 80). The Stanford Research Institute (SRI) (1978) argued Japan's future economic growth would not even approximate the phenomenal levels achieved during the 1950s and 1960s. Even the Japanese were pessimistic regarding the recovery of steel production (SRI 1978).

The implications of these changes were clearly drawn out in many of the background reports. It was anticipated that offshore markets for metallurgical coal sales during the 1980s would be weak because "... supply is expected to exceed demand until sometime in the early 1990s." (Patching et al. 1980, 81). RTNAS (1976) argued the Japanese, who had been strongly encouraging new coal mining projects by offering financing as well as long term contracts, were becoming reluctant to invest in raw material sources.

In the short term they are likely to give priority to encouraging incremental expansion or new mines which can be self-financed or require minimal external finance. They are less likely to consider large coal mining projects involving considerable infrastructure financing and large external borrowing. (RTNAS 1976, 37).

Another report argued that the Japanese objectives in metallurgical coal sourcing had changed, and that now "... the lowest delivered price of coal having minimum quality requirements is the operative criterion." (RTNAS 1978, 11).

The specific implications of these changes for metallurgical coal production from BC were addressed by Jones and Sivertson (1979). Their analysis of the Japanese steel industry indicated very slow expansion during the 1980s, and they noted that metallurgical coal

imports would not increase very much. In fact, if existing and expected contracts came into being, Jones and Sivertson argued that the Japanese would have 69 MMT under contract by 1985, sufficient to meet the requirements of the steel industry. Only if steel production expanded to 130 MMT by 1985 would additional metallurgical coal imports need to be increased, and then only by 6 MMT. Jones and Sivertson argued there would be intense competition for this market because approximately 20 MMT of supply would be competing to meet the additional demand. Jones and Sivertson concluded that large new coal mining projects in regions where new infrastructure would be required would be extramarginal suppliers.

The background reports emphasized the lack of a market opportunity for increased metallurgical coal sales to Japan, given the structural changes occurring in the global steel market. Critics of the NECP also voiced this concern. Halvorson's (1980a) analysis of the JSI led him to conclude that production of 120 to 130 MMT of crude steel in 1985 would generate import requirements of 63 to 69 MMT of metallurgical coal.³² Halvorson reported that Kaiser Resources Ltd. was forecasting Japanese import requirements at 67 MMT in 1985, and 73 MMT in 1990. In addition, Halvorson (1980a) observed that Mr. Nomura of Mitsui and Co., in a speech in Vancouver on May 25, 1980, forecast that Japanese coking coal imports would be 65.5 MMT in 1985. Halvorson strongly criticized the government's use of a higher forecast of metallurgical coal requirements and imports.

While agreeing with the background reports regarding the difficulties of the JSI in the mid-1970s (BC 1982a, 19), the government's analysts apparently did not believe these problems and their causes would persist. They remained optimistic and expected a moderate recovery in the JSI. The final estimate of Japanese coking coal import requirements in 1985 was at the upper end of the range established in a number of

³² Halvorson's analysis also assumed a decrease in the amount of oil used in blast furnaces, but his ratio was 577 kilograms of coal/tonne of steel.

background studies, exceeding these forecasts by 10 to 15 MMT (BC 1982a, 21) (Table 6.15). Geographic shifts in the global pattern of steel production that were obvious in 1980 (Patching et al. 1980) were ignored. Near maximum utilization of the 145 MMT of steel-making capacity in Japan was assumed. The structural changes in the JSI and their implications for future Japanese imports of metallurgical coal were treated as overly pessimistic. The experts' predictions that there would be a global oversupply of metallurgical coal until the early 1990s, were treated as a moot point should the Japanese agree to long-term contracts for coal from northeastern BC. The basic premise of the benefit-cost analysis was that

... this was perhaps a unique opportunity, which may not exist again for many years when the many factors affecting coking coal supply and demand ... came together to produce a large volume sales opportunity in a reliable market such as Japan. (BC 1982a, 26).

Before the benefit-cost analysis was released to the public, the potential overestimation of this market opportunity was recognized, and the pre-project analysis commented that "... recent pessimism about the recovery of the world economy by 1985 might indicate lower levels of steel production could be expected for that year." (BC 1982a, 22). Yet, as we shall see, the potential of decreased demand was not considered in the formulation of price projections for the NECP.

The significant amount of attention directed towards the demand-side dynamics of the metallurgical coal market was not matched in the analysis of the supply side. The pre-project analysis simply noted that the potential supply of 284 MMT of metallurgical coal in 1990 would greatly exceed the forecast 198 MMT required, and emphasized that price competitiveness would determine which coals found markets. However, the pre-project study did not analyze the relative costs of the potential new supply, nor compare it to the costs of coal from northeastern BC.

The government's assessment of supply factors focussed on the amount of coal that was under contract to the JSI. The JSI was expected to have 96 MMT of metallurgical coal under contract by 1987. Compared to the pre-project forecast of import requirements in 1985, a potential oversupply of 16 MMT was indicated (BC 1982a). The pre-project analysis ignored this potential oversupply problem, arguing that many factors could contribute to lower deliveries than contract volumes indicated. In particular, the analysts argued there was a high degree of uncertainty associated with imports from the USSR and China, a strong potential for supply disruptions to reduce actual shipments from contracted tonnages, and the strong possibility that some metallurgical coals would shift into thermal uses if the real price for thermal coal increased relative to metallurgical coal. However, their key assumption was that Canada would increase its share of the Japanese metallurgical coal import market from its traditional 16% (Horie 1988, 30) to 27% by 1985, rising to 30% by 1990. The analysts claimed this assumption was supported by remarks made by Mr. Nemoto, the Managing Director for Nippon Kokan KK (which is the lead purchaser for the JSI in Canada), at the protocol signing for the NECP on February 10, 1981 in Vancouver. The notion of the Japanese diversifying their supply sources to eventually achieve a 30-30-30 split among suppliers in Australia, Canada and the United States had been widely discussed for a number of years (Halvorson 1980b, I-12), and was based on the assumption that the fundamental objective of the Japanese sourcing policy was security of supply. Thus, the analysts assumed that price competitiveness was not the critical variable driving the additions of supply capacity during the early 1980s.

Expansion of metallurgical coal capacity in Canada and Australia in the early 1980s was substantial, increasing from 43 MMTPY in 1979 to 74 MMTPY in 1987 (Horie 1988). Between 1980 and 1987, 14.7 MMTPY of capacity was added in Queensland, Australia, 13.9 MMTPY was added in BC, and 2.4 MMTPY was added in Alberta, for a total capacity increase of 31.0 MMTPY (Horie 1988). Total metallurgical coal capacity in these

two countries increased by 72% in seven years; approximately 20 MMTPY of this new capacity was under contract to the JSI.

As a result of the increased supply and decreased demand, the JSI found itself in a position of oversupply in the mid-1980s. Requiring only 56.7 MMT of metallurgical coal imports in 1986 and potentially no increase over this level in 1987, the JSI's Australian and Canadian suppliers alone had the capacity to supply 74 MMT in 1987. JSI suppliers in the US and other countries would have raised this total supply capacity substantially. Thus, the JSI was forced to manage the oversupply situation, which it did by negotiating price and volume cuts with many of its suppliers. Prior to the expansion in the coal industry, the JSI purchased approximately 80% of contracted volumes from its suppliers in Australia and Canada. After the expansion, purchases from old mines gradually dropped to about 40% of originally contracted volumes, while purchases from new mines remained at approximately 80% of contracted volumes (Horie 1988).

Although Canada's share of the JSI's metallurgical coal imports in 1985 was 24.7%, price competitiveness has become an issue for the buyers, contrary to the pre-project assumptions. The two mines in northeastern BC are among the highest cost suppliers in the Pacific Rim (Table 6.16). There is sufficient coal available to satisfy JSI requirements at significantly lower prices than the northeastern mines can meet (Figure 6.1).

TABLE 6.16
ESTIMATED TOTAL COSTS/MT FOB,
METALLURGICAL COAL MINES:
BY COUNTRY (1980\$C)

Mine	1 ^a	Estimates 2 ^b	3 ^c
South Africa			
old	27.72	N/A	15.78
new	31.68	N/A	22.69
Australia			
Queensland			
old	46.53	28.86 ^d	23.67
new	49.50	39.29 ^d	49.31
New South Wales			
old	41.58	28.86 ^d	26.63
new	47.52	39.29 ^d	44.38
United States			
East			
old	49.50	58.73 ^f	49.31
new	49.50	58.73 ^f	64.11
West			
old	47.52	63.79 ^e	49.31
new	54.45	63.79 ^e	64.11
Canada			
Alberta			
old	42.57	46.28 ^d	35.50 ^d
new	51.48	57.82 ^d	73.97 ^d
BC			
old	42.57	46.28 ^d	35.50 ^d
new	58.41	57.82 ^d	73.97 ^d
BOC	N/A	63.39	N/A
QCL	N/A	80.40	N/A

^a BC (1986), based on 1984 data for bituminous coal production; assumed the high estimates represented metallurgical coal production

^b Barnett (1985), based on 1985 data

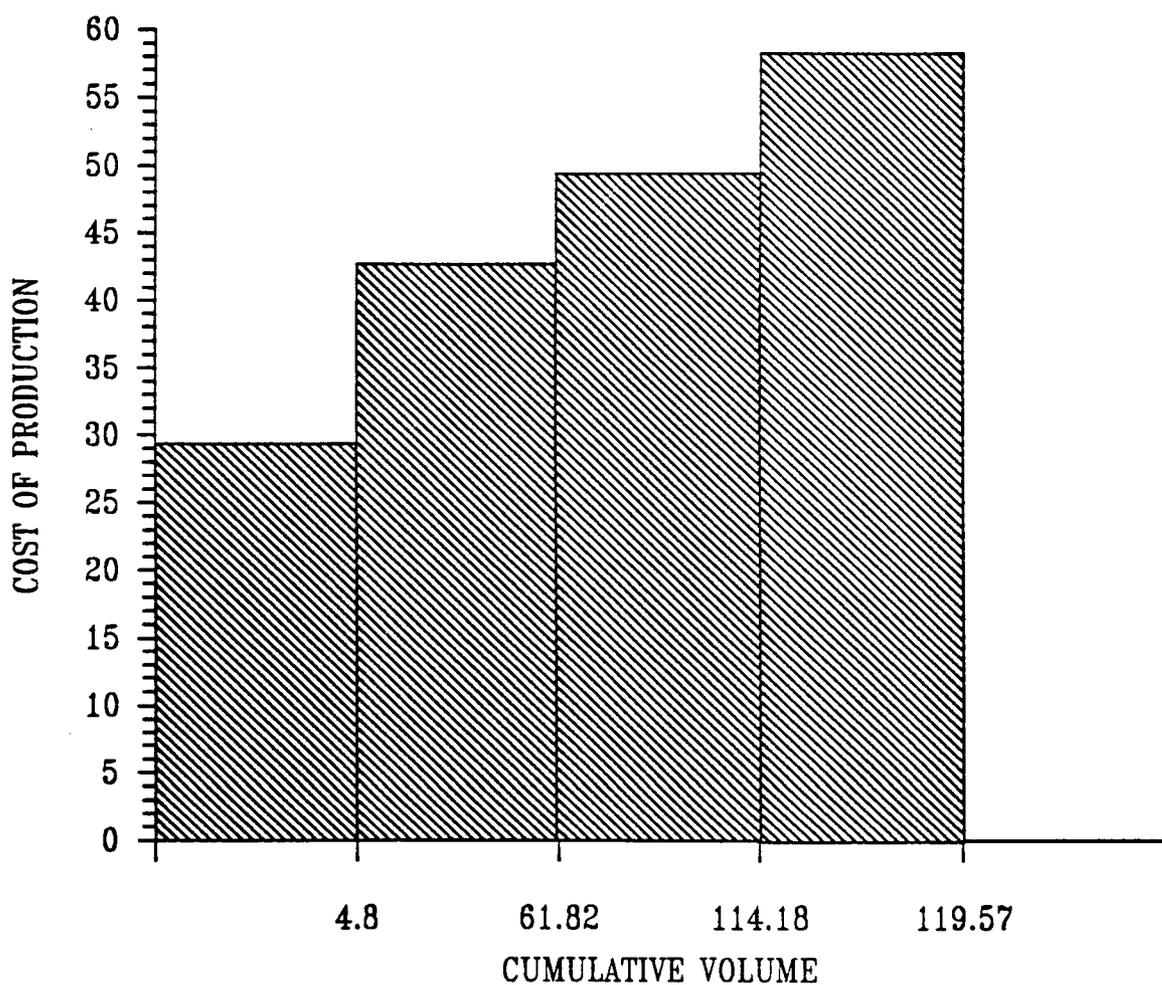
^c IEA (1988), based on 1986 data; assumed the low and high estimates represented older and newer mines, respectively.

^d Country averages

^e Average for medium volatile metallurgical coal in USA

^f Average for low volatile metallurgical coal in USA

FIGURE 6.1
1984 COST CURVE FOR METALLURGICAL COAL SUPPLY,
(1980\$/MT)



Source: BC (1986), based on 1984 data.

The abundant supply of coal and the increasing importance of price competitiveness were indicated in the commissioned background reports for the Economic, Finance and Marketing Analysis Sub-Committee, and in other analyses of the NECP. The one background report that addressed the future supply of metallurgical coal (RTNAS 1976) suggested potential supply, excluding BC production, could increase from 97 MMTPY in 1975 to 284 MMTPY in 1990, and 306 MMTPY in 1995. A large proportion, about 67%, of the projected increase was expected to come from the US and Australia, supplying an additional 54 MMT and 39 MMT respectively (RTNAS 1976, 5). Almost all of the new supply from the US and slightly under half of the new Australian supplies was expected to benefit from proximity to existing transportation infrastructure and so would be relatively low cost: 21 MMTPY of the increased supply in these two countries could be available at a cost of between \$43.00/MT and \$55.00/MT (1980\$C). New capacity above that would be more costly to develop, and the background report estimated that the marginal cost of supplying 200 MMTPY by 1990 would be \$78.40/MT (\$1980C).³³

This background study indicated that there were certainly cheaper supplies of metallurgical coal available, and that the northeastern mines were at the outer limit of the supply curve. The northeastern mines and some of the new projects in Australia represented a non-incremental expansion and increase in the cost of supplying metallurgical coal. They were expansions into new territory and required new infrastructure. Given this study's conclusions that substantial supply increases could be achieved at marginal cost increases, and the declining expectations regarding future steel production and metallurgical coal demand, the market-clearing price and the ability of the northeastern mines to compete should have been a concern in the pre-project analysis.

³³ All of the cost estimates included a 25% pre-tax return on capital invested. Thus the cash costs were significantly less, and in conditions of over-supply cash costs are the critical ones.

The supply and price competitiveness issues were also a concern for critics of the NECP. Halvorson (1980b) argued the JSI had contracted 6.1 MMT of excess supply for 1985. Assuming full deliveries on 1979 contracts, 61 MMT of supply would be available to the JSI in 1985. Based on a forecast of 120 MMT of steel production in 1985, Halvorson argued the JSI would only require 63 MMT of metallurgical coal imports. Compared to existing 1979 contracts, only 2 MMT of new supply was needed, yet new contracts signed by the JSI in 1980 totalled 8.1 MMT. Thus, Halvorson argued there would be an excess supply of 6.1 MMT in 1985. Halvorson's analysis was flawed because he assumed full contract deliveries. This rarely occurs; data in Horie (1988) suggest that mines usually supplied 80% of contracted volumes to the JSI in the 1970s.³⁴ If this factor is taken into account, the overcontracting disappears and in fact indicates that the JSI needed 6.1 MMT of extra supply for 1985. Nevertheless, Halvorson noted there was a large amount of supply being offered to the JSI (42 MMT), again indicating the impending price competition in the metallurgical coal market.

In summary, the pre-project analysis of supply and demand was optimistic. The potential for relatively low cost capacity expansion in the face of a slowing in the rate of growth of demand was not adequately assessed. But perhaps more significantly, none of the demand and supply side analysis was actually utilized in the forecast of coal prices.

The price forecasts used in the benefit-cost study were based on the terms of the contract which specified a firm price based on a formula to April 1, 1987 for QCL and April 1, 1989 for BOC. After these dates the price was to be renegotiated by the contracting parties. In the absence of agreement on a renegotiated price, the price was to be set by arbitration based on the then prevailing competitive price of coal.

³⁴ This performance indicator was not because of insufficient demand, but rather because of constraints on the supply side.

The prices used in the benefit-cost study were based on the formula specified in the contract to the date of the price reviews and on the forecast competitive price for the period after the price reviews. The competitive price forecast was based on a short and long term analysis. The short term projection assumed real prices would grow at 1.2% per year during the 1980s. The assumed starting price in 1980 for the projection was Balmer Mine's price of \$63.00/MT; after applying the assumed growth rate, prices were forecast to be \$70.00/MT in 1990 (1980\$C). After 1990, the long-term price projection assumed prices would increase at a real rate of 0.6% per year. This was based on a long term trend line analysis of coal prices for the period 1870 to 1977, and did not incorporate the demand and supply factors reviewed in the study. There was no justification provided for the assumed 1.2% increase in prices during the 1980s.

In the 1980s, competitive prices for metallurgical coal have not followed the pre-project projection. Table 6.17 shows the price paid to Balmer Mine for metallurgical coal compared to the pre-project projection. Since 1983, competitive prices have significantly diverged from the pre-project projections. Real price increases that occurred in the 1970s were not sustained in the early 1980s and prices in 1986 were back to 1973 levels, the peak year of Japanese crude steel production.

TABLE 6.17
METALLURGICAL COAL PRICE/MT,
BALMER MINE AND PRE-PROJECT PROJECTION (1980\$C)

Year	Balmer	Pre-Project Projection
1970	\$32.22	n/a
1971	35.96	n/a
1972	37.20	n/a
1973	40.49	n/a
1974	50.62	n/a
1975	78.86	n/a
1976	74.91	n/a
1977	74.29	n/a
1978	71.33	n/a
1979	64.82	n/a
1980	62.94	\$63.00
1981	60.42	63.76
1982	68.58	64.52
1983	55.24	65.30
1984	52.79	66.08
1985	51.20	66.87
1986	48.32	67.67
1987	40.02	68.49
1988	n/a	69.31
1989	n/a	70.14

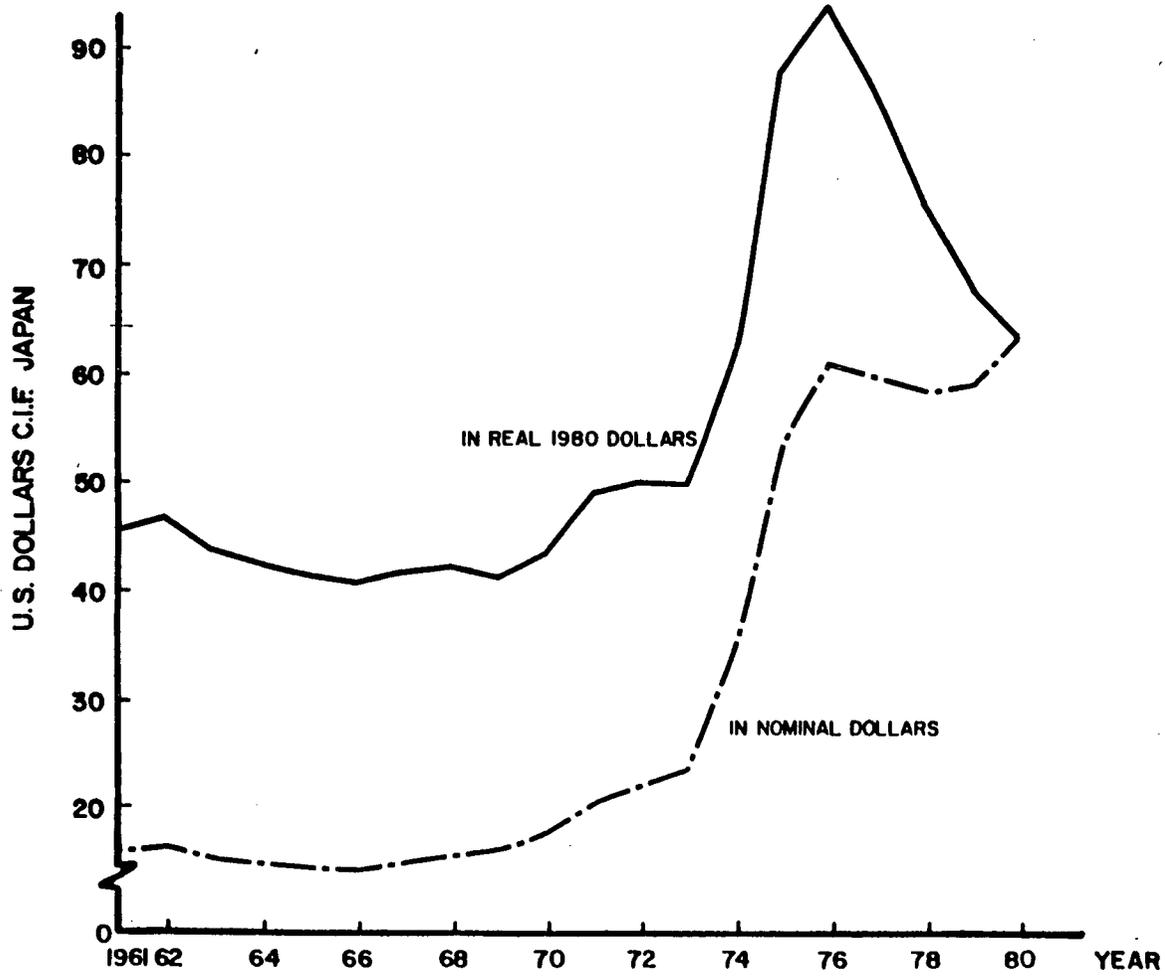
Source: Horie 1988, 296; BC 1982a.

The short-term pre-project price projections were based on two fundamental assumptions. First, the pre-project analysis took \$63.00/MT as the starting point for the projection. Second, a real growth rate of 1.2% per year during the 1980s was assumed. Both assumptions were suspect, given information on long-term price trends in the metallurgical coal market in the supply and demand analysis.

Figure 6.2, taken from the pre-project analysis, shows that the 1980 starting point for the pre-project price projections was relatively high compared to the longer-term trend for BC metallurgical coals. Figure 6.3, also from the pre-project analysis, shows that, overall,

FIGURE 6.2

HISTORY OF WESTERN CANADIAN COKING COAL PRICES

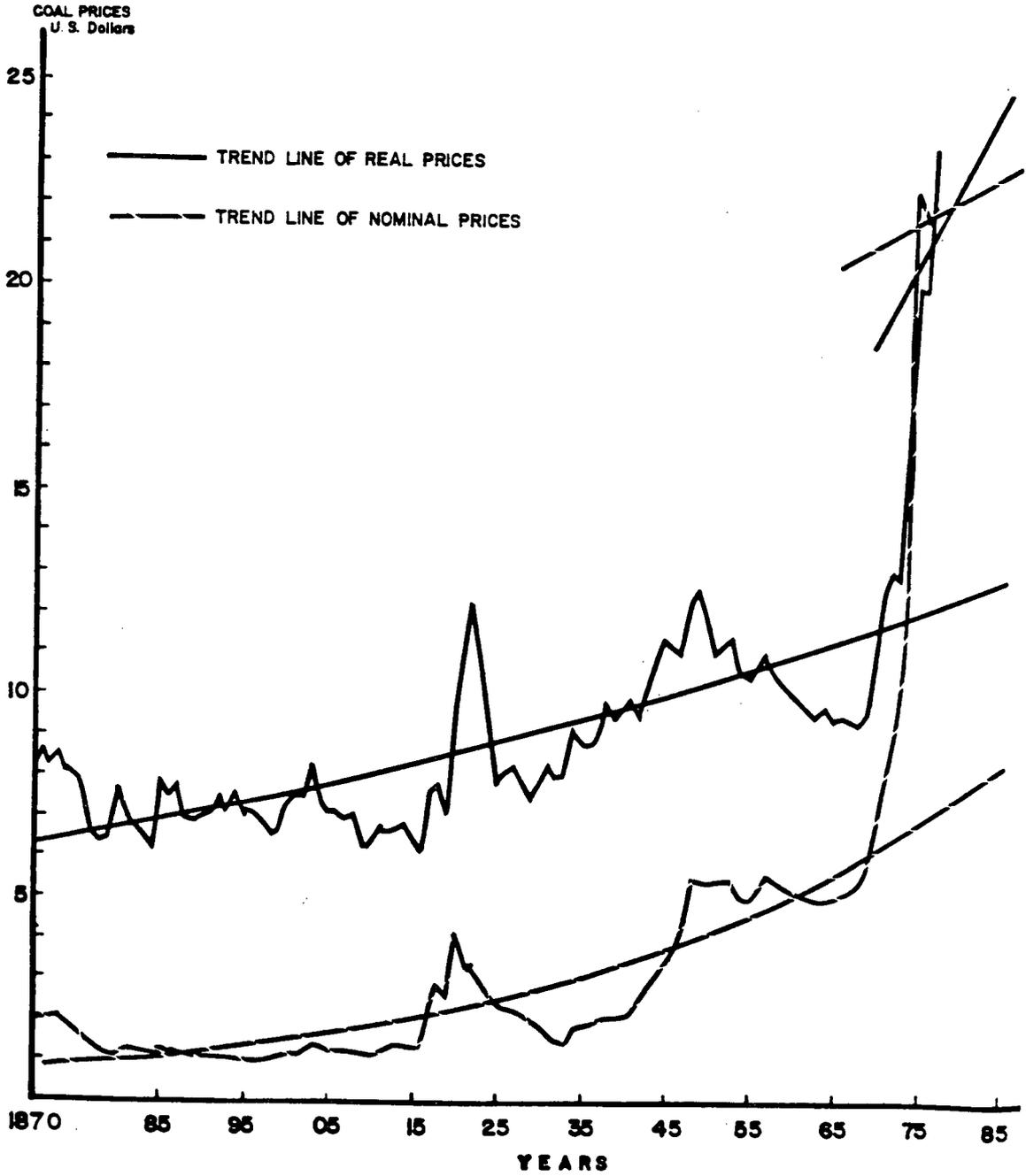


Source: BC (1982a)

SOURCE OF NOMINAL PRICE SERIES: TEX REPORT 1976 & 1980
REAL DOLLAR INDEX: CANADIAN INDUSTRY SELLING PRICES

FIGURE 6.3

HISTORY OF U.S. BITUMINOUS COAL PRICES 1870-1977
(in constant 1954 US dollars)



Source: BC (1982a)

metallurgical coal prices have grown slowly. Prices have exhibited the wide fluctuations that are typical of commodity markets, but periods of high prices have always been followed by declines as new supply was developed. In an early analysis of metallurgical coal prices for the NECP planning process, Sivertson and Clancy (1976) argued that the price increases of the 1970s were a temporary phenomenon.

... the message is clear: current coking coal prices do not reflect their scarcity value, they are much above the long-run equilibrium level. We should expect them to fall and fall considerably as new coal deposits are brought into production. (Sivertson and Clancy 1976, 40).

The real growth in prices over the long-term, depicted in Figure 6.3, was calculated by the pre-project analysts to be 0.6% per year. The short-term price forecast assumed a growth rate twice this level, and was clearly overly optimistic. The pre-project analysis started its projection from a position above the long-term trend line, which was an overly optimistic assumption given the normal fluctuations in commodity markets.

More conservative price forecasts than the one used in the pre-project analysis should have been utilized. The average selling price for Balmer coal during the 1970s was \$56.07/MT. The average selling price for all bituminous coals from western Canada to Japan from 1972 to 1980 was \$55.48/MT (Statistics Canada Coal Mines, Cat.#26-206, various years). These prices, based on average prices during the hectic 1970s, could have been used as base case or even optimistic price scenarios. The wisdom of using the averages this way becomes evident on closer examination of the pattern of long-term prices (Figure 6.3). While it is true that prices rose above the long-term trend line four times during the 1870 - 1975 period, they also dropped below the trend line three times, and remained below the trend line for a sustained period of time (approximately 10 years each time). In addition, the real price gains were stimulated by wars (the US Civil War, WW I, WWII and the Korean War, and the Vietnam War/OPEC actions) (Sivertson and Clancy 1976). Once

these influences waned, decreased demand and excess capacity placed extreme pressure on prices until general economic growth caught up, or another war began. Consequently, the ability of the metallurgical coal market to sustain the real price increases that occurred during the 1970s should have been questioned by the pre-project analysts, especially given the anticipated lower rates of growth in demand and the large number of potential projects.

The coal sales contracts significantly reduced the risks surrounding the NECP by specifying the volume to be sold over the entire contract length and the prices to be paid during the initial three to five years. This raised the importance of the price issue over the medium and long term. Yet, the price projections used in the pre-project analysis were overly optimistic, and unprecedented real increases in metallurgical coal prices were accepted by the government's analysts, despite indications of declining demand, ample supply, and historical experience that real price increases have not been sustained. Given these concerns at least one of the price scenarios in the sensitivity analyses should have anticipated the actual real price declines back to the long run price trend. Instead, the worst case price scenario simply assumed no real increase in prices beyond 1980.

In addition to the assumed price scenarios, the second factor influencing the pre-project's projections of revenues from coal sales was the NECP's assumed output. The analysts assumed that full contract volumes of metallurgical and thermal coal would be sold, despite the fact that during the 1970s, coal mines under contract to the JSI were rarely able to supply more than 80% of the contracted volumes (Horie 1988). The mines' performance was not due to insufficient demand, but to constraints on the supply side. Start-up difficulties were experienced by QCL; it did not meet its production targets in 1984 and was not placed into commercial production by its managers until 1985. Because of higher operating costs and low prices, sales of thermal coal have been suspended since 1986;

thermal sales prior to that were only a fraction of the 1.0 MMTPY contracted amount. Sales from the northeastern mines have been significantly less than assumed in the pre-project analysis, but this possibility should have been anticipated. The mines were located in new territory where very limited previous mining had occurred. The geology of the coal seams was inadequately understood, and the companies had no previous experience in coal mining. The same factors that should have led the analysts to expect cost overruns should have made them cautious regarding the assumed output of the mines.

6.5 SUMMARY

A requirement of the NECP's planning process was an overall economic evaluation of the mega-project, integrating the findings of the various Sub-Committees into a final assessment of the project's social feasibility. BC's Ministry of Industry and Small Business Development utilized a benefit-cost analysis to complete the evaluation. The pre-project analysis argued the NECP was a socially efficient use of public funds. The financial appraisal showed that all sectors except the provincial government earned a rate of return on capital invested in excess of 10%. The inclusion of additional social costs and benefits strengthened the fundamental conclusion by significantly increasing the present value of the project's net benefits, and the returns to the two governments. The sensitivity analyses showed improved results in all cases except one.

The *ex post* analysis suggests that the NECP was not a socially efficient use of public funds. The difference between the pre-project and *ex post* analyses was caused by higher capital and operating costs, particularly in the mining sector, and lower project revenues than anticipated. Potential overruns in project costs were not considered in the pre-project analysis despite ample evidence that cost overruns were highly probable, especially due to the high level of uncertainty surrounding the technical aspects of the project and the

developers' lack of experience in coal mining. Capital and operating cost estimates from the mining companies were not independently evaluated. Warnings from the Province's Chief Geologist regarding the technical uncertainties surrounding the QCL property were ignored. Project revenues were overestimated despite indications that Japanese demand was waning and that a large amount of additional supply was being developed in Australia and southeastern BC at relatively low cost, and despite historical evidence that high metallurgical coal prices are followed by long periods of depressed prices. The coal sales contracts specified the volume to be sold over the entire contract period, and the price during the early years. The analysts did not use the supply and demand analysis in projecting prices beyond the fixed period in the contracts. Real price increases observed during the 1970s were assumed to be a break from past price trends.

The pre-project benefit-cost analysis was overly optimistic, given the uncertainties associated with the technical and economic aspects of the mega-project. The market analysis was superficial and demonstrated an inadequate understanding of coal markets in particular, and commodity markets in general. The absence of a cost-curve analysis of the NECP compared to other producers made any assessment of the competitiveness of the NECP producers impossible. The sensitivity analyses were all optimistic alterations of the base case assumptions, save one. Despite warnings regarding the risks of this mega-project, the excessive optimism was maintained, and inadequate attention was paid to the potential downside of the NECP. Had the pre-project analysis varied some of the assumptions used in the base case to allow for higher costs and lower revenues, essentially looking at a worst case scenario, the marginal nature of the NECP would have been revealed. However, the sensitivity analyses that were conducted reinforced the conclusions that the NECP was an economically efficient project. Except for one, the sensitivity analyses all made positive adjustments to the base case. Lower capital costs, higher output, and higher prices were all considered; of course, these scenarios all increased the

NECP's net present value. The only sensitivity analysis that reduced the net present value was the one based on low coal prices. Even here, the real price increases that occurred during the 1970s were assumed to be sustained. The possibility of real price decreases, despite the observation of such occurrences in the long-term price behaviour of US bituminous coal, was not considered.

The low coal price scenario in the pre-project analysis is instructive as it suggested the mining and provincial government sectors would sustain losses with the discount rate set at 10%. The analysts cautioned that this did not indicate that these sectors would actually lose money, but rather that the rate of return on the capital invested by these sectors would be less than a real rate of 10%. The lower rate of return to the mining sector was justified by analysis that suggested the real rate of return to mining capital in Canada has been 7% (BC 1982a, 100). The lower rate of return to the Province was justified as "... the price which the province bears in its role as catalyst for a development which is expected to have far-reaching economic impacts as production expands over time." (BC 1982A, 152). However, had a real price decline been analyzed, combined with some assumptions regarding capital cost overruns, it is doubtful whether any amount of justification would have overcome the projected social costs.

In addition to the pervasive optimism, the methodological approach of the pre-project analysis skewed the distribution of net benefits to favour the government sectors. Corporate income taxes were included as benefits to the governments, contrary to the recommendations of the Province's own benefit-cost guidelines (BC 1977b). In addition, the social opportunity costs of labour and foreign exchange may have been assumed to remain constant for the life of the project, and the valuation of externalities was cursory. Additionally, certain externalities of the NECP, such as the loss of wilderness lands, were not identified or discussed. These methodological issues are significant weaknesses in the

pre-project analysis and may also have produced an upward bias in the projection of the NECP's net benefits.

An additional methodological issue, and one that provides an important insight into the nature of the NECP's planning process, is that benefit-cost analysis was used in this case to examine a single option. Again, this contradicted the Province's own guidelines for benefit-cost analysis (BC 1977b) which note that the excess of social benefits over social costs is a necessary but not sufficient condition for projects to pass the efficiency test. A thorough review and comparison of alternatives is required for a project to be chosen as the most efficient option. The narrow, and incorrect, use of the benefit-cost technique in the pre-project analysis suggests the provincial government was preoccupied with developing a second source of coal supply in BC despite ample evidence that additional coal supply could be brought on stream in the southeast at significantly lower cost and risk. A benefit-cost analysis comparing additional supply from the northeast versus the southeast was not completed, and apparently the provincial government accepted the JSI position that it would not buy additional coal from BC without a second supply source being developed.³⁵ The perceived and professed needs of the coal purchasers strongly influenced the NECP's design and evaluation and permeated the planning process.

The government's benefit-cost analysis was released in July of 1982, more than a year after the protocol agreement had been signed that committed the provincial and federal governments to the NECP, and a year after the construction work started. The timing of this release was obviously inappropriate; the decision to proceed had already been made

35. Premier Bennett often referred to the JSI's position when speaking about the rationale for the NECP. However, the Province apparently took this position as a given and did not attempt to determine whether the NECP was in the provincial interest, nor whether the JSI could be convinced to buy additional coal from the southeast. Given the JSI's interest in diversifying away from Australian and US suppliers, it is possible the JSI would have altered their position had the Province said it was not in the interests of its residents to proceed with the NECP.

and the analysis presented simply served to justify the public sector's involvement in the project. The inaccessibility of the planning process and the delayed release of the benefit-cost analysis meant there was little opportunity for the public to criticize the pre-project economic evaluation.

CHAPTER SEVEN

SUMMARY, CONCLUSIONS, AND PLANNING IMPLICATIONS

7.1 SUMMARY

This research investigated the potential influence of a staple mentality and selected characteristics of natural resource mega-projects on the public planning process. The thesis argues that these factors create forces within the planning process that lead to an inappropriately-framed planning problem, and tend to weaken rational analysis and stampede the planning process. The characteristics of mega-project planning processes proposed in this research are summarized below.

- 1) Governments will be involved in mega-projects, and the dominant orientation of this involvement will be to facilitate the mega-project either by improving access to the natural resources or by reducing their cost. The government's role in the mega-project may strongly influence the focus of any public planning process. Government involvement may be perceived and portrayed as a key factor in the mega-project proceeding.

- 2) The tendency of political processes to produce outcomes that favour concentrated interests in society may be amplified in a mega-project planning process. Private sector participants, bureaucrats and politicians may dominate the process, and the apparent opportunities a mega-project offers to these participants to increase their status and power may also have an important influence on how planning issues are defined. Potential constraints may become the primary focus of the planning process.

- 3) The complexity and uniqueness of mega-projects will encourage governments to design *ad hoc* planning processes that are conducted within temporary institutional and organizational frameworks. The mandate of the planning process may be overly narrow, and may focus on resolvable issues rather than attempt to deal with the inherent uncertainties surrounding mega-projects. A focus on technical issues will tend to amplify the role of experts within the process.
- 4) The focus of the planning process may be closely aligned with the interests of staple producers and purchasers. Other government objectives may receive inadequate attention.
- 5) The expectations formed within the planning process regarding the mega-project's contribution to regional economic development and its economic viability may be overly optimistic. Optimistic expectations may be amplified by the zealous activities of the mega-project's key promoter. As a consequence, risk and uncertainty may be understated and contradictory evidence ignored. Optimistic expectations may be reinforced by the symbolic meaning of the mega-project.
- 6) The planning process may focus on maximizing short term benefits and minimizing short term costs due to the mega-project's high visibility and discrete nature. The rentier philosophy of government, and the participants' aversion to failure may reinforce this.
- 7) Strong momentum may build around the mega-project as increasing investments of time, effort and prestige are made during the planning process, particularly given the extended planning horizons often involved. The growing momentum may reinforce the overly optimistic expectations formed within the process.

- 8) There may be intense conflict among the various participants as negotiations proceed.
- 9) Governments may have little previous experience with the particular staple or with mega-projects. This may disadvantage governments in bargaining processes.
- 10) The mega-project's contribution to economic growth and development may be less than expected due to the persistence of a rentier philosophy in government. Effective public intervention to counter the forces that thwart linkage development in a staple-based economy may not be forthcoming.
- 11) As problems develop with the mega-project, the concentrated interests created by it may successfully demand ongoing public subsidies.

The case study findings support many of these hypotheses. The role of the government in this mega-project was perceived as improving access to northeast BC's coal resource, and the planning process was fundamentally biased by this perception. Coal supply alternatives within BC were not compared to the northeast option, nor were alternative regional development strategies compared to the NECP. The first planning phase focused on infrastructure costs and constraints. The Sub-Committees established within the planning task force and their terms of reference, and the resource allocation within the planning process suggest the major planning issues were perceived as selecting the most efficient transportation and townsite infrastructure. There was no Regional Development Sub-Committee within the planning task force because it was implicitly assumed that staple production would generate regional economic development.

The planning process became narrower as time progressed, and focused increasingly on maximizing the short-term benefits and minimizing the short-term costs associated with the mega-project. After selecting the infrastructure options, enormous planning resources were committed to engineering and design studies for those options. Comparatively miniscule resources were allocated to preparation of a broader regional development strategy involving identification and encouragement of potential regional linkages. The implementation phase focused on project management to control financial costs, and impact mitigation to control social costs.¹ There were specific targets set for construction milestones in the comprehensive legal agreements between the government and the mining companies, yet the articles dealing with regional hiring and procurement were indicative only. No training programs or significant initiatives to promote regional business development were implemented.

The government's involvement in providing infrastructure for this mega-project was consistent with the traditional role of the BC government in promoting staple production, and many of the political pronouncements about the NECP emphasized its symbolic meaning. Large-scale resource developments have not been uncommon in BC, and provincial government involvement in such projects has been justified by reference to their province-building contributions. Some of the public discussion surrounding the NECP emphasized how this mega-project would re-orient BC's economy. The two key politicians supporting the NECP, the Premier and the Minister of Economic Development,² called the NECP a way to develop a neglected region of BC, and portrayed it as a fundamental component of a long term strategy to diversify the province's economy. The NECP was invested with an emotional element which focused on the mega-project's transforming

¹ The latter focus may only have arisen because of the enormous regional demo-economic impacts projected by the government.

² The Minister of Economic Development was also the Chair of the Cabinet Committee on Coal and thus the head of the NECP's planning task force. He was also the MLA for the Peace River area.

quality. Defensive arguments were also made to justify the government's involvement. The Premier suggested the NECP lessened the province's, and the JSI's, reliance on a single transport and port system that could be affected by natural disasters or prolonged labour disruptions. The meaning of the NECP was particularly stressed when criticisms of the mega-project were made.

The focus of the NECP's planning process coincided with the interests of the coal suppliers and purchasers. The purchasers' problem was to ensure a reliable and sufficient supply of metallurgical coal from a variety of sources at a reasonable price. The suppliers' problem was to get the infrastructure in place that would allow them to access the apparently unlimited future market. The government's problem became building the most efficient infrastructure, in effect removing the most significant constraint facing the suppliers. A large proportion of the planning analysis focused on comparing the relative costs and constraints of various infrastructure packages, and the summary economic evaluation of the NECP did not compare this mega-project to other coal supply or regional development options.

Identifying and overcoming the constraints associated with infrastructure provision required significant technical expertise and the role of infrastructure experts within the planning process was very large. The planning was conducted within the public bureaucracy and the consulting industry. Information generated within this planning circle remained within it until it was formally released by the politicians to the public at intervals in the process. By the time key information became publicly available, construction on the mega-project had already begun. No institutional arrangements were made to facilitate public participation in the planning process, and a public review of the mega-project was rejected by the politicians.

Momentum built around the NECP and within the planning process. The substantial planning resources committed to the NECP process were not reallocated to other policies or projects when markets flagged in 1977. The programmed studies continued so that the government would be ready for a change in market circumstances, suggesting that considerable momentum had been established within the planning process during the first phase. In addition, the government attempted to identify and develop additional markets for BC coal, especially from the northeast. The key politicians supporting the NECP undertook numerous trade missions to Japan and other steel-producing countries on the Pacific Rim, and the government established a Coal Coordinator's office to promote development of BC's coal reserves. Finally, despite outstanding concerns within the planning task force regarding the metallurgical coal market, the government moved quickly to implement the mega-project as soon as the purchasers expressed renewed interest. The outstanding concerns were apparently insufficient to delay or stop the mega-project proceeding. The powerful positions held by the key politicians supporting the mega-project may have played an important role in maintaining this momentum.

The timing of the planning process was strongly influenced by external factors. The planning program during the first year and a half was designed to meet QCL's targeted construction start up date, and planning activity was relatively intense. Once markets flagged, planning activity lessened and continued at a slower pace. When markets improved suddenly in 1980, planning activity intensified. During the implementation phase, the dominant emphasis was on completing the infrastructure components on time so that the conditions of the coal sales contracts could be satisfied. Project management and cost control became major implementation issues because of the short time frame for the construction period. Conflict within the negotiations surrounding the mega-project followed the level of planning activity, but was particularly intense during the last phase when the final commitments were being negotiated.

Within the planning process, expectations regarding the mega-project's contribution to regional economic development and its economic viability were formed early and were based on a recent period of enormous growth in coal prices. A regional economic development study completed in 1975 by provincial government staff identified the coal resource as the largest opportunity for economic growth and diversification in northeastern BC. In 1976, the province's coal task force projected enormous growth in demand for metallurgical coal into the late 1990s. The government had little previous experience with metallurgical coal production, and the most recent experience had been very positive because of the high prices. Exploration and development expenditures on coal properties in BC increased enormously during the early 1970s, and a plethora of proposed projects rushed forward. The government rapidly set about preparing the institutional framework to address the anticipated new role for coal in the provincial economy.

The expectations formed during this early phase were maintained despite evidence that suggested they were overly optimistic. In the analysis of the NECP's economic viability, continued high prices were forecast despite historical evidence to the contrary. Costs were underestimated despite evidence that indicated cost overruns were highly probable. The apparent concerns of the Economic, Finance and Marketing Analysis Sub-Committee regarding the stability of the market upturn in 1980 were not reflected in the benefit-cost analysis released to the public for review. The NECP's regional economic growth impacts were also overstated due to inappropriate and unjustifiable technical assumptions.

Uncertainty was inadequately addressed within the planning process. Potential geological problems were ignored. The proponents' lack of experience in coal mining was not considered. No risk analysis was completed. The technical analysis of the mega-project's regional economic growth impacts contained no sensitivity analysis, and the sensitivity

analyses in the economic evaluation were all positive adjustments to the base case assumptions, save one. The planning process focused on resolving technical issues and reducing uncertainty within the government's traditional domain, infrastructure provision.

To date, the mega-project's impacts on regional economic development have been marginal and probably far less than expected, and its economic viability is threatened. The rentier philosophy of the government, and its apparent belief that staple production is regional economic development, focused planning resources on the mega-project itself and not on the linkages to the project. Training programs for disadvantaged groups within the region, or for regional residents generally, were not developed or implemented. Procurement requirements were never more specific than broad, indicative, policy statements. Local hiring or procurement targets were not established in the comprehensive agreements. The NECP planning process was a project planning process not a regional development planning process.

7.2 DISCUSSION AND CONCLUSIONS

The first area where conclusions from this research may be advanced concerns the role of natural resource mega-projects in regional economic development. This research suggests that natural resource mega-projects have serious limitations as a mechanism for promoting regional economic development, particularly in the absence of successful efforts to direct a significant portion of the economic benefits towards individuals from disadvantaged groups within the region. Natural resource mega-projects can certainly produce economic growth, but the benefits will most likely be in the hands of those who are already relatively well off within the region, and a large proportion of the benefits will accrue to businesses and individuals located outside the region. In addition, mega-projects may increase regional economic specialization in the primary sectors, thus increasing the region's vulnerability to

fluctuations in global commodity markets. Also, natural resource mega-projects are a top-down approach to regional economic development planning. Many regional development theorists argue that this approach cannot produce regional development because it does not strengthen local and regional institutions, nor the capacity of residents to learn and act (Stohr and Taylor 1981; Weaver 1984).

Even the growth impacts of mega-projects may be less than expected. Early expectations were based on the boom-town model (Gilmore and Duff 1974), which suggested that a large-scale project located in a slow-growth or stagnant rural economy dominated by agricultural activities could induce dramatic population growth at rates exceeding 10% per year. The boom-town model suggested that a number of other outcomes could be expected to accompany this rapid growth. In-migrants would get most of the jobs, particularly the best jobs; the in-migrants would be young, transient, predominantly male individuals who would not be interested in becoming involved in the community; inflation would become rampant; local services would become overloaded; taxes would go up; there would be a high rate of labour turnover in existing businesses; people would become alienated and suspicious, and social disruption would lead to higher crime rates, more juvenile delinquency, more mental health problems, and more family breakdowns.

After 15 years of further research, the boom-town model has been significantly altered, and increasingly it is recognized that the characteristics of the project and the region will have an important influence over the nature of the socio-economic impacts. In general the findings suggest:

- 1) population growth rates and economic impacts are usually less than expected (Gilmore et al. 1982; Murdock et al. 1981; Murdock et al. 1984; Murdock et al. 1985), and the best generalization that can be made at this

- point is that population stability or moderate growth has replaced population decline in most cases (Murdock et al. 1982),
- 2) the population and economic impacts are spread out over a much larger area than anticipated (Leistritz et al. 1981; Gilmore et al. 1982), and the service sector is fairly slow to respond to the economic stimulus of a large project (Gilmore et al. 1982),
 - 3) these projects probably will not save small, declining communities, as in-migrants will choose to settle in larger communities with more services (Gilmore et al. 1982; Summers and Branch 1981),
 - 4) in-migrants are generally younger, have smaller household sizes, more formal education, and higher incomes than residents, but in these characteristics they are no different from migrants generally (Murdock et al. 1980; Summers and Branch 1981; Murdock et al. 1981),
 - 5) in-migrants do not necessarily get all the best jobs (Murdock et al. 1980),
 - 6) the economy's occupational structure does not appear to change significantly (Murdock and Schriener 1978), although the evidence is considered inconclusive at this time (Shaffer and Vatne 1984),
 - 7) the economy's industrial structure does not become more diversified, but either becomes more specialized or the earlier dominant economic activity is simply replaced by the new industry (Leistritz and Murdock 1979; Murdock and Schriener 1978; Gartrell et al. 1980), and
 - 8) community social structures are not permanently altered by these projects (Murdock et al. 1985). Disruption does occur but it is not as general, nor as profound as assumed in early analyses (England and Albrecht 1984; Dixon 1978; Summers and Branch 1981; Gartrell et al. 1980; Murdock et al. 1981; Wilkinson et al. 1982).

The findings from this study do not contradict the general patterns observed in the literature regarding economic growth. In the NECP case, the mega-project stabilized the regional economy during the recession, but the new economic activity the mega-project created appeared to replace other economic activity that was disappearing. The NECP did not resolve the unemployment problem in the regional economy, and the growth impacts were less than expected. Had the regional economy been in a growth period, there could have been higher leakages and more in-migration. More in-migration could have produced some of the impacts identified in the boom-town model, although not necessarily to the same degree. In this case, the decision to build a new town for those directly employed in the mining industry may have significantly lessened some of the boom impacts in the other communities.

Beyond the growth impacts, the literature suggests the diversification impacts of mega-projects are questionable, and this research supports that finding. In the NECP case, the regional economy became more specialized industrially, and the proportion of 'blue-collar' employment opportunities appeared to increase. These shifts may be temporary, resulting from lags in the regional economy's response to the mega-project. However, it seems unlikely that significant industrial or occupational diversification will occur over the medium term. In addition, the increases in per capita and household incomes and educational levels recorded for the region were concentrated among in-migrants and residents of the new town. Few regional residents from disadvantaged groups have benefitted from the mega-project.

Growth will not, in and of itself, lead to a 'healthy' regional economy that is resilient to outside forces, that provides a sustainable and adequate standard of living for its residents, that offers challenging and rewarding employment opportunities to its residents, and that encourages the talents of its residents in making their own future. The potential for mega-

projects to contribute to regional economic development may be inherently limited by their capital intensive, high technology, top-down nature. When the size of the investment is considered, even the potential growth contributions appear to be quite marginal. This research suggests that to achieve some improvement in regional economic development impacts, more action must be directed towards ensuring that the economic benefits of the project accrue to regional residents. In addition, the participation of regional residents in mega-project planning processes may produce lasting development impacts as individuals and groups within the region participate in and learn about economic development planning.

The second area where conclusions from this research may be advanced concerns the forces influencing natural resource mega-project planning processes. This research suggests the staple mentality and the traditional role of the state are important structural forces that fundamentally influence the orientation of the public planning process. These factors suggest that the public planning problem may be defined as how to facilitate the mega-project, rather than a more fundamental question such as what are the alternatives to the mega-project. It may be implicitly assumed that staple production produces economic development, and the rentier philosophy of the state may work against effective action to maximize the economic development benefits.

This fundamental bias may be amplified by the concentrated and powerful interests associated with the mega-project, and the symbolic meaning and momentum that such a large undertaking generates. Overly optimistic expectations, underpinned by the staple mentality and the inexperience of government, may not be checked. Uncertainty may be inadequately addressed, particularly if it is associated with concerns considered to be outside the government's area of responsibility or role in the mega-project.

Other analyses of mega-projects and mega-project planning processes have highlighted some of these problems. The inadequate treatment of uncertainty in mega-project planning has been widely recognized (Seifried 1977; Hall 1980; Rees 1980a; Berkes 1981; Goldsmith and Hildyard 1984; Rees 1984a; Sewell 1987; Berkes 1988), as has the prevalence of unjustifiable arguments or assumptions, particularly in overestimating the mega-project's benefits and underestimating its costs (Hall 1980; Formby 1981; O'Riordan 1981; Goldsmith and Hildyard 1984). The tendency to proceed in the face of criticism or outstanding concerns has also been observed (Rees 1980a; Goldsmith and Hildyard 1984). In addition, numerous observers have argued that mega-project planning processes are overly narrow, often tending to focus on technical issues and giving inadequate consideration to alternatives (Formby 1981; O'Riordan 1981; O'Riordan and Sewell 1981; Rees 1984a; Goldsmith and Hildyard 1984; Sewell 1987; Rees 1989).

Explanations of why these problems arise in mega-project planning processes have tended to emphasize the role of concentrated interests in influencing policy and planning outcomes (Hall 1980; Rees 1980a; Formby 1981; Goldsmith and Hildyard 1984; Rees 1989). The power of government planning and implementing institutions has been suggested to be a critical factor in determining the orientation and outcome of the planning process (Payne 1987; Sewell 1987). A few observers have argued that the symbolic meaning of the mega-project may be important (Formby 1981; Goldsmith and Hildyard 1984; Sewell 1987), and a few have suggested that the lack of a comprehensive policy framework to guide mega-project planning is a fundamental problem with the process (O'Riordan and Sewell 1981; Rees 1989).

A few researchers have suggested that a fundamental structural force may be influencing the orientation of the public planning process for natural resource mega-projects. Formby (1981) suggested the pioneer mythology and the perception of a need to 'develop Australia'

are important, and long-standing, influences underpinning attitudes to resource exploitation in that country. These attitudes tend to favour development over conservation, and potentially limit the number and range of alternatives considered. Sewell (1987) and Payne (1987) suggested the myth of hydro-industrialization is an important factor underpinning the policy decisions to build big dams, and that this myth or its assumptions are often never questioned.

The argument advanced in this thesis is that the staple mentality and the traditional role of the state as a facilitator of staple production are important factors driving the narrow orientation of the public planning process for a natural resource mega-project. This argument enriches our understanding of why planning processes may be narrowly defined, and suggests that improving mega-project planning is not simply a matter of:

- a) 'better' planning, i.e. more synoptic or technically sophisticated analyses and strategies, particularly given this high level of uncertainty surrounding mega-projects, or
- b) 'better' implementation, i.e. ensuring that the focus does not shift overwhelmingly to project management.

Such improvements might be beneficial, but may be insufficient. At the minimum, a full public review of any mega-project by an independent agency should be required before commitments are made or construction begins. Such a requirement would, and has, raised questions regarding alternatives, uncertainty, and expectations. It may also facilitate and enhance social learning about mega-projects, and about broader economic development/resource management issues that could, over time, lessen the influence of a staple mentality on policy-making and planning. Variations in process improvements are explored in the next section.

7.3 PLANNING IMPLICATIONS

This research suggests that improvements in the design of planning processes for natural resource mega-projects are fundamental to countering the problems of biased orientation and narrow problem definition. Planning processes must encourage a full discussion of alternatives and uncertainties, and counter the momentum and symbolic meaning associated with mega-projects. Other researchers concerned with placing mega-projects into a broader policy framework have suggested a two-tiered hearing process be implemented (O'Riordan and Sewell 1981). The first tier is a policy review of the mega-project, and should the result of the first tier be positive, the second tier focuses on regional development and project-planning for the mega-project.

The focus of the first tier process should be very broad and allow questions related to, for example, whether coal mining is appropriate, whether coal mining is the best regional development strategy, and whether a mega-project is an appropriate strategy. Issues explored could include coal demand and supply, environmental and economic sustainability, technology, safety, regional impacts, risks, alternatives, and feasibility. An example of this approach is the Ranger inquiry into uranium mining in Australia (Formby 1981). Assuming the result of the first tier of the planning process was a decision to proceed with the mega-project, the second tier would then address mega-project planning and regulatory issues, such as infrastructure options, regional development strategies, and impact management strategies. Regional residents should be the major participants in any regional development planning and should participate in designing and implementing appropriate regional development programs. Concurrently or consecutively with the second tier of the planning process, the specific project review processes for each component of the mega-project would be completed.

Instituting a permanent two-tiered process for mega-project planning faces a number of obstacles. One would be the unwillingness of politicians and senior bureaucrats to open up policy discussions to the general public. Another would be getting the public to participate in such discussions. However, to continue to use Royal Commissions or other *ad hoc* inquiries to conduct policy level discussions is too discretionary, and this is unacceptable where mega-projects are involved. A permanent two-tiered planning process for mega-projects may not be used very often. Mega-projects are spread across Canada, and significant periods of time may elapse between projects in any one province or region. This suggests that any individual or social learning achieved in one such process may not be drawn on again for a very long time. However, the skills and knowledge gained may be transferable to other policy issues.

This research suggests there are a number of key substantive issues that must be considered in a mega-project planning process. First, the major categories of direct economic benefits from mega-projects are the direct employment opportunities and the purchasing requirements. Regional economic development strategies, designed and implemented with the full participation of regional representatives, should focus on these areas. In the area of employment opportunities, training facilities and programs should be established early, and the employment requirements should be reasonable and widely communicated to regional residents. Consideration should be given to establishing specific targets regarding regional hiring, and incorporating these targets in the comprehensive legal agreements. Special recruitment and training strategies for individuals from disadvantaged groups should be designed and implemented with the participation of representatives from those groups to ensure that the regional economic benefits of mega-projects are more evenly distributed within the region. In the area of purchasing requirements, seminars to acquaint regional businesspeople with the purchasing needs of the mega-project, and to acquaint the mega-project operator with the regional business

sector could be held. Commitments from the mega-project operator regarding regional procurement could be included in the comprehensive legal agreements.

Second, risk must be minimized. There are a number of ways to reduce risk, including using existing communities to house direct employees, staging development over a longer period of time, and building multi-purpose infrastructure. The technical and financial information supplied by project proponents should be independently evaluated. Also, the project should be examined within a provincial framework to ensure that excess domestic capacity will not be created.

Finally, impact management processes should be designed and implemented with the participation of regional representatives. Several researchers have argued that flexible, responsive and community-based processes are the most appropriate institutional approach to assessing and managing the regional and community impacts of mega-projects (Boothroyd and Shires 1982; Krawetz et al. 1987; Rees 1989).³ The committee, group or agency responsible for managing impacts should also be required to document them, and should be funded appropriately. This kind of documentation should provide a solid information base for compensation negotiations. The issue of cumulative impacts should be addressed at the policy level so that it does not delay compensation payments.

In addition to the planning implications outlined above, a number of technical recommendations may be made. At the policy level, more use should be made of risk assessment and scenario writing techniques in analyzing mega-projects. Also, BC's benefit-cost guidelines should be updated to reflect current knowledge, experience and practice. At the minimum, the guidelines should be followed for all projects involving

³ Typically, the processes evaluated in the literature have focused on socio-economic impacts, but bio-physical impacts could, and perhaps should, be part of the mandate of these processes. Staff or information support from provincial government agencies would be required.

provincial government investment, and any deviations should be clearly explained. These rationales should not be confidential documents. The guidelines should require any market analysis to include consideration of relative costs of production, and should require consideration of the financial feasibility of the project to ensure that it will not require ongoing public subsidies. The guidelines should also require sensitivity analyses of the key variables in a benefit-cost analysis, especially prices and costs, and should require consideration of positive and negative changes in these variables. The requirement for sensitivity analyses should be adopted in other guidelines that require technical analyses of impacts, such as the Coal Development Guidelines.

7.4 OPPORTUNITIES FOR FURTHER RESEARCH

This research presents a systematic examination of a natural resource mega-project planning process, and extends the staple theory to an analysis of such a planning process. By doing so, it improves our understanding of the forces affecting this kind of planning process and suggests how the role of the state in a staple-based economy and a staple mentality may fundamentally influence the orientation of a mega-project planning process. In addition, this research suggests that the symbolic meaning associated with mega-projects, and the momentum that builds around them, may be very important influences on the planning process that reinforce the tendency for overly optimistic expectations to be formed regarding a mega-project's contribution to regional economic development. This research also presents a comprehensive, *ex post* analysis of the regional economic development impacts of a natural resource mega-project and thus addresses a gap in the planning process and the published literature.

The research findings on the planning process might be strengthened by interviews with planners and politicians who were involved with the process. When this research was

conducted more than 12 years had elapsed since the beginning of that process. Participants' memories of the process and of their perceptions and expectations during the process may have faded or been biased by subsequent events. Nevertheless, relying on formal documents produced in the planning process is not completely satisfactory. The research findings on the regional economic development impacts of this mega-project might be strengthened by the results of a random sample survey of regional residents and businesspeople regarding the NECP's impacts, and by a more sophisticated methodological approach than the comparative region analysis.

The conclusions suggested by this research are based on one case study of a mega-project planning process. Their applicability to other cases must be investigated carefully in further research. Additional studies of the regional development impacts and planning processes of other mega-projects in Canada are an important element in this research. These data would allow researchers to compare and contrast a number of cases, further enriching our understanding of the dynamics of mega-project planning processes.

There are several other interesting avenues for future research. Continuing to follow the impacts of the NECP on the South Peace over time would be useful, and methodologically challenging. Examining the symbolic meaning of mega-projects to the Canadian public would be an interesting research area. More detailed studies of expectation formation during the planning process could elucidate the heuristic tools used by various participants, the manner in which scientific information is used, and perhaps the importance of the symbolic meaning of a mega-project in influencing expectations.

Establishing a national network of researchers and participants in mega-project planning might be useful. A research program to document impacts and evaluate planning

processes could be developed that would provide an important data base, an opportunity to share resources and information, and a mutual learning environment.

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APPENDIX 3A

CHRONOLOGY

This chronology is based on numerous information sources including extensive newspaper clipping files, popular periodicals such as BC Business, industry publications and journals, conference proceedings, theses, and published articles.

- 1970 The Coalition Mining Company commences initial exploration work on the Sukunka coal property in northeast BC; Denison Mines Ltd. and Alco Standard Corp. announce an agreement-in-principle with two Japanese companies to conduct a feasibility study on coal properties in northeastern BC, and they form Quintette Coal Ltd. (QCL); the Japanese companies are Mitsui Mining Co. and Tokyo Boeki Ltd. who will pay \$1.25 million to earn a 10% interest in licenses of QCL's property; the Japanese companies also pledge their 'best efforts' to finance 50% of the debt required for mine development (Province, 18/9/73; Malkinson and Wakabayashi 1982)
- 1972 Premier WAC Bennett, at a campaign rally, outlines a multi-million dollar coal development in the Sukunka Valley; coal to be shipped over BCR lines from Chetwynd to Vancouver (Sun, 3/8/72)
- 1973 Balmer Mines in southeast BC receives \$21.64/MT FOB for metallurgical coal (\$40.49/MT 1980\$C) (Horie 1988)
- 1974 Balmer Mines receives \$30.92/MT FOB (\$50.62/MT 1980\$C) for metallurgical coal, an increase of \$10.28/MT from the 1973 price (Horie 1988)
- 1974-1975 as part of a General Development Agreement with the federal government, (Subsidiary Agreement on Planning), a series of regional development studies for BC are completed; one on northeast BC commissioned in March 1974, released in 1975 - The North East Report - identifies the Peace River coalfields as
- a major opportunity for regional economic development ... (which) would require detailed and careful planning to ensure that the maximum economic benefits were achieved while at the same time minimizing adverse social and environmental impacts (Malkinson and Sivertson 1978, 3).
- 1975 Balmer Mines receives \$53.00/MT FOB (\$78.86/MT 1980\$C) for metallurgical coal, an increase of \$22.08/MT from the 1974 price (Horie 1988)
- 1975-1976 a flurry of coal exploration activities occurs in northeast BC
- March/75 the provincial government commissions a Coal Task Force to review all aspects related to development of the Province's coal resources (including an inventory of resources, outline of coal rights, federal and provincial requirements for domestic steel-making, energy generation and other uses) (BC 1976a)

- summer/75 QCL secures a letter of intent for 5 MMTPY of metallurgical coal from the JSI; delivery scheduled to begin in 1979 (Malkinson and Wakabayashi 1982)
- Dec./75 the provincial government outlines \$1 billion in potential coal developments in northeastern BC; all projects in early stages of development, and expected to come onstream in early 1980s; coal would be shipped over the BCR lines from Chetwynd to Prince George, then over the CNR track to Prince Rupert where Neptune Terminals is studying feasibility of a new port (Sun, 2/12/75)
- 1976 Balmer receives \$54.64/MT FOB (\$74.91/MT 1980\$C) for metallurgical coal, an increase of \$1.64/MT from the 1975 price (Horie 1988)
- Jan./76 in response to private sector initiatives, the Ministry of Economic Development submits a policy paper to the provincial Cabinet proposing an extensive evaluation of the viability of the northeast coal development; in response, the Province strikes a Cabinet Committee on Coal Development and appoints Don Phillips, MLA for the Peace River constituency and the Minister of Economic Development, as the Cabinet Minister responsible; the Cabinet Committee forms 5 Sub-Committees to analyze the northeast coal potential (Coal Resource, Environment and Land Use, Manpower, Townsite/Community Development, and Transportation); the Sub-Committees are charged with developing respective terms of reference, undertaking feasibility analysis and documenting summary findings; the Ministry of Economic Development is made responsible for over-all coordination, with additional responsibility for initiating marketing, financial and social studies necessary for integration with Sub-Committee work into a final overall economic analysis of the NECP; budget of \$4.5 million committed to the study program for 1976-77 fiscal year (Malkinson and Sivertson 1978).
- early/76 the BC government realizes the magnitude of the NECP requires the involvement and cooperation of the federal government in the planning, development and operation phase; proceeds to negotiate a Subsidiary Agreement to Evaluate North East Coal and Related Developments with the Department of Regional Economic Expansion; Subsidiary agreement not signed until January 1977, but planning and analysis work proceeds (Malkinson and Wakabayashi 1982)
- Feb./76 the Coal Task Force releases its report (BC 1976a); report is optimistic regarding the potential for expansion, but identifies key issues as 1) the supply of skilled labour for underground mining, 2) the gaps in the transportation system, especially in the northeast, 3) the potential difficulties given the geological aspects of mining in the northeast, and 4) the potential difficulties of forecasting capital costs accurately, noting the problems Kaiser Mines had in southeast BC in the early 1970s.
- Feb./76 Premier William Bennett announces that coal will be the key to the continuing development of the Province's economy; emphasizes that putting in infrastructure ahead of demand encourages mines to be on stream before the markets pick up (Sun, 25/2/76).

- Feb./76 Sidney Chan, mining analyst at Pemberton Houston Willoughby, notes that Japanese and US steelmakers are no longer expanding and that new steel capacity will be in South Korea, Taiwan, Brazil and Mexico; he also suggests that expansions in BC's coal industry are most reasonable in the southeast because of existing transportation and services (Sun, 28/2/76)
- March/76 the Environment and Land Use Committee of the BC Cabinet publishes the 'Guidelines for Coal Development'; the Guidelines stress the need for advance planning and a rational approach to major resource developments such as coal mining:
- Major resource developments such as coal mining ... will change environmental, social and economic conditions in the region of development. Careful planning of large-scale coal developments is therefore necessary to ensure that a rational approach to managing land use, environmental and community impacts is undertaken prior to final decisions on coal and related developments being made (BC 1976c, 3).
- Apr./76 expenditures on coal exploration in BC are increasing rapidly from \$600,000 in 1973, to \$3.5 million in 1975, and are forecast to be \$10.3 million in 1976 (Sun, 23/4/76)
- Apr./76 the BC Institute for Policy Analysis releases an analysis of coal markets (Sivertson and Clancy 1976); the analysis argues that current high prices are temporary and advises caution on price assumptions for coal expansion
- May/76 Phillips says that all of the projects in the north east coal development will have to be economically viable (Province, 31/5/76)
- June/76 Bennett says the aims of the government's new coal royalty policy is to balance the need for a fair return to the treasury with a desire to encourage economic development (Sun, 26/6/76)
- June/76 Brascan Ltd. decides not to exercise its option to purchase 60% of Brameda Resources Ltd. which is the owner of the Sukunka coal deposit in northeast BC; despite spending more than \$14 million on exploration costs, Brascan says it does not expect a sufficient return on capital investment to justify its participation in the project (Province, 28/12/76)
- fall/76 A nine-man economic mission from Japan visits Canada; President of Nippon Kokan KK, the lead negotiator for the Japanese steel industry (JSI) in Canada, says that the BC government will have to provide transportation infrastructure and a townsite for coal development in northeastern BC to proceed (Sun, 26/10/76)
- Oct./76 Phillips says the province has to have new resource developments to keep its tax base growing to maintain services to provincial residents; argues that despite the room for expansion in the East Kootenays, money spent to encourage coal development in the northeast means developing a neglected region of BC; Phillips says he is negotiating with the JSI to buy at least 10 MMTPY from the northeast, as the Province has determined that this is the level of production necessary to make building the infrastructure worthwhile (Sun, 27/10/76)

- Dec./76 Premier Bennett meets with Prime Minister Trudeau regarding financing arrangements for infrastructure needed to get the NECP to proceed (Montreal Star, 27/12/76); rumours circulate that the BC government is worried about the economic future of BC because of the bleak outlook for the forestry industry and the associated loss of jobs and revenue (Province, 2/12/76)
- 1977 the JSI tries to negotiate \$7/MT rollback of metallurgical coal prices with southeastern mines, but are unsuccessful; the JSI says it will be looking for price cuts of \$3/MT in 1977 because of 'softness' in steel market in 1976 and low growth expectations for 1977 (Financial Post, 26/2/77)
- 1977 Balmer Mines receives \$57.59/MT FOB (\$74.29/MT 1980\$C) for metallurgical coal, an increase of \$2.95/MT from the 1976 price (Horie 1988)
- Jan 1977 the Province and the Government of Canada sign the Subsidiary Agreement to Evaluate North East Coal and Related Developments for fiscal year 1976-77; under subsidiary agreement, federal government agrees to share \$3 million of planning costs for 1976-77 fiscal year; establishes Management Committee and series of federal-provincial Sub-Committees which are based on the provincial Sub-Committees, and adds an Economics, Finance and Marketing Sub-Committee (Malkinson and Wakabayashi 1982)
- Jan./77 British Petroleum Co. agrees to buy 87.5% of Brameda's Sukunka coal licenses for \$30 million (Financial Post, 22/1/77); Imperial Oil Ltd. proposes to buy 6.75% interest in QCL (Sun, 25/1/77); exploration expenditures in BC in 1976 were 47% higher than anticipated, totalling \$15 million for the year (Province, 28/1/77)
- Feb./77 BC opposition parties argue that development of the northeast coal deposits will not be economic unless the price of exported coal increases by at least \$15/MT, from the current price of \$55/MT to \$70/MT FOB; also argue that the development proposal in 1975 included construction of a steel mill in BC, and now that this has been scrapped, predict that the federal government will not be interested in the northeast coal development (Province, 15/2/77)
- March/77 BC's Minister of Energy, Mines and Petroleum Resources, James Chabot, argues development of the northeast will not affect the coal industry in the southeast (Province, 25/3/77)
- May/77 Subsidiary Agreement to Evaluate Northeast Coal and Related Developments extended for fiscal year 1977-78; under extension, a further \$12 million committed to comprehensive analysis and design studies, with intention that these studies would advance the planning process to a level where governments would be able to respond quickly to private sector initiatives; QCL targetting Fall 1980 start-up date with construction beginning in fall 1977 (BC 1981b)
- summer/77 Cabinet Committee on Coal releases studies completed under first phase of Subsidiary Agreement (see Appendix 3B) - studies note that the key factors affecting the viability of the north east coal development are 1) market

conditions for coking coal (volumes and prices), 2) availability of skilled labour for underground mining, and 3) technological issues related to underground mining. The studies also identify preferred locations, in terms of *efficiency*, for physical infrastructure (rail line, highways, port, townsite), and recommends further studies and analysis for fiscal year 1977-78; recommending townsite at Tumbler Ridge, highway from Chetwynd to Tumbler Ridge, BCR spur line from Anzac into Tumbler Ridge and new port at Prince Rupert (Malkinson and Wakabayashi 1982)

- June/77 BC releases provincial Coal Policy; Bennett says the policy establishes a framework within which this vital natural resource will be developed for the maximum benefit of all British Columbians (Province, 3/6/77)
- and suggests that coal will eventually outrank the lumber industry in providing employment, resource revenues and taxation (Sun, 3/6/77).
- Sept./77 JH Morrish, President of Fording Coal Ltd., argues the BC government's optimism regarding coal as the "economic saviour of the provincial economy" is misplaced and shows the government does not understand the metallurgical coal market; he argues that markets are not expanding as they did in the early part of the decade, and that the JSI is in the third year of depressed production and is currently operating at 70% of capacity; he does not expect any new coal mines will be required until 1982 and no expansion of existing mines until 1980 or 1981, and argues that any expansion can be developed in the southeast with no investment by the government (Financial Post, 17/9/77)
- Oct./77 a study on coal markets for the provincial Ministry of Economic Development argues the current high prices and demand are temporary (Sivertson 1977); the report concludes it is unlikely that any increase in Canadian coking coal production will be required before 1985, and points to the danger of potential overproduction of metallurgical coal in the early 1980s
- Nov./77 at the Royal Commission on British Columbia Railway, representatives from the Centre for Transportation Studies at UBC testify that the proposed BCR line into the northeast coalfields will be too costly (Province, 22/11/77)
- Nov./77 the Ministry of Economic Development presents a preliminary benefit-cost analysis of the NECP to the provincial Cabinet; analysis is based on studies completed in 1976-77 and interim results of 1977-78 studies, and on QCL, Sukunka and/or Cinnabar mines proceeding in various combinations; the only case where the net present value of the NECP is negative ($r=.10$) is if QCL is the only mine to proceed and coal prices are about 6% less than \$62.00/MT FOB (1976\$C) (equal to about \$80.00/MT in 1980\$C) (Malkinson and Sivertson 1978)
- 1977 a global recession in steel demand emerges; the NECP planning process is continually monitored and modified to reflect latest circumstances; dramatic cuts in studies are made (Malkinson and Wakabayashi 1982)

- 1977 QCL is unable to reach a production decision during 1977 due to the recession in world markets, especially in Japan; company begins revising feasibility studies, examining alternative scales of production, alternative mine development plans and mining methods, alternative markets in Europe, South America and Korea (Malkinson and Wakabayashi 1982)
- 1978 Balmer receives \$58.66/MT FOB (\$71.33/MT 1980\$C) for metallurgical coal, an increase of \$1.07/MT from the 1977 price (Horie 1988)
- Apr./78 expenditure of moneys available under Subsidiary Agreement for 1977-78 fiscal year totals approximately \$4 million (Malkinson and Sivertson 1978)
- 1978 the provincial and federal governments extend the 1977-78 Subsidiary Agreement for two years to keep the budget residual available for further government initiatives or studies (BC 1981b)
- Aug./78 the Report of Royal Commission on the British Columbia Railway (MacKenzie et al. 1978) recommends that the BCR not get involved with the NECP unless it is assured of traffic sufficient to recover all capital and operating costs; in the Commission's opinion, if any route from the coalfields directly to the CN line prove feasible, so that routing over existing BCR trackage would be unnecessary, the BCR should avoid involvement in the NECP. (p. 79)
- Sept./78 the Cabinet Committee on Coal Development says plans to develop the Peace River coalfields will continue "at a snail's pace" until world markets improve (Financial Post, 9/9/78)
- 1979 Balmer Mines receives \$58.66/MT FOB (\$64.82/MT 1980\$C) for metallurgical coal, the same price received in 1978 (Horie 1988)
- Jan./79 a co-operative study between the Province and the Government of Canada regarding metallurgical coal market in Pacific rim concludes there is insufficient demand for the NECP to go ahead
- ... additional coal supplies for Japan will likely first come from areas with existing infrastructure, because of cost considerations ... (Canada's) major advantage is that steel mills want to rely more on Canadian suppliers. Still, commercial considerations predominate.
- There does not appear to be a consensus on which new projects in Canada would likely get the nod. Size and low cost appear to be prime factors in the choice. The appropriate scale for new projects appears to be not more than 2×10^6 tonnes. A project of $4 - 5 \times 10^6$ tonnes is too large now. (Jones and Sivertson 1979, 18).
- Jan./79 Graham Kedgley is appointed as Coal Coordinator for BC; his job is to promote development of BC's coal reserves (Vancouver Express, 5/1/79)
- May/79 the JSI is doing studies of coal demand to 1990 to estimate requirements over next decade; Kedgley says the future development of coal mines in BC may depend on the study findings, but the JSI's steel production is on the

upswing and expected to increase from 108 MMT in 1979 to 130 MMT by 1990 (Globe and Mail, 21/5/79)

- June/79 negotiations are underway among the provincial government, BCR and British Petroleum regarding expansions of the rail system to ship coal from the Sukunka deposits, but nothing to be confirmed until JSI decide to buy more coal from northeastern BC (Sun, 12/7/79)
- June/79 Denison announces an agreement with the government of Romania for metallurgical coal sales of 1.3 and 1.5 MMTPY for 20 years; shipments to begin in 1982 (Sun, 12/7/79)
- Oct./79 Bennett and Phillips visit Japan but are unable to get firm commitments from the JSI regarding the NECP; the JSI is concerned about high prices, lack of infrastructure and potential labour disputes (Sun, 23/10/79)
- 1980 Balmer Mines receives \$62.94/MT FOB (\$62.94 1980\$C) for metallurgical coal, an increase of \$4.28/MT from the 1979 price (Horie 1988)
- 1980 conflicts emerge within the JSI regarding further purchases of coal (Catliff 1985)
- Jan./80 Nippon Kokan KK expresses concern to the JSI about the impact of pulling out of the NECP on Japan's commercial relations with Canada and BC in particular; the JSI is unable to agree to scrap negotiations (Catliff 1985)
- March/80 Subsidiary Agreement to Evaluate North East Coal and Related Developments extended to March 31, 1981
- Apr./80 NKK leads a trade mission to BC to discuss financial and infrastructure aspects of the NECP with provincial government officials; Phillips announces that a deal with the JSI could be as close as months away, adding that 'it boils down to financing transportation out of the coalfields' (Sun, 29/4/80)
- Apr./80 Phillips says Canada is on the verge of losing a \$500 million per year coal deal because the federal government is "dragging its feet" on a rail cost-sharing agreement with the province; Phillips responding to statements from senior Japanese foreign ministry official, Matsao Kawan, who said that "unless the Canadian coal industry gets moving it will lose out on a share of the rapidly expanding Japanese markets." (Province, 29/4/80)
- May/80 Japanese Prime Minister Ohira pays a state visit to Canada to discuss, among other things, the NECP with Prime Minister Trudeau and his cabinet, and Premier Bennett and his cabinet. The federal Minister of Economic Development announces that he expects BC to pay the entire cost of the rail link from the coal fields to the CNR main line (Province, 5/5/80). According to the newspapers, Trudeau suggests that the Japanese purchase a CANDU reactor from Canada, and that BC renounce its demand for compensation associated with the Alaska Highway Gas Pipeline in return for federal infrastructure funding (Province, 6/5/80; Sun, 7/5/80).
- May/80 RC Hermann, Vice President of Denison Mines, announces that companies with northeast coal properties should have firm contracts with the

Japanese steel companies by the end of the summer, but closing the deal will depend on the federal and provincial governments reaching some agreement regarding infrastructure funding (Globe and Mail, 7/5/80)

May/80 Premier Bennett announces that BC might have to go it alone on the infrastructure costs for the northeast coal development (Sun, 9/5/80)

May/80 after a meeting between Phillips and senior federal politicians, the federal government drops its demand that federal funding for the coal development be tied to the Province giving up its claim for compensation related to the Alaska Highway Gas Pipeline; Phillips announces that the JSI has insisted on a June 15, 1980 deadline for price and security of supply commitments - this is allegedly an extension on an earlier May 30 deadline (Province, 25/5/80)

June/80 agreement-in-principle reached regarding infrastructure funding after special meeting on June 11 between the federal and provincial governments, the CNR and the coal mining companies; the JSI allegedly extends the deadline one week (Sun, 13/6/80)

June/80 the federal government announces its contribution to infrastructure requirements; National Harbours Board (NHB) to pay initial capital costs of Ridley Island coal terminal, DREE to pay for 50% of costs of access road to Ridley Island, and CNR to pay for upgrading main line between Prince George and Prince Rupert; BCR to shoulder financial responsibility for rail link from Prince George to Tumbler Ridge (Province, 17/6/80); cost estimates suggest the coal price will have to be between \$71 and \$75/MT (Sun, 18/6/80)

June/80 Nomura, Executive Vice-President of Mitsui and Co. (Canada) Ltd. which is a part-owner of QCL, says the JSI must have a reasonable price for the northeast coal, and that Canadians had better hurry to get in on the anticipated annual growth of 3% to 5% in JSI output (Sun, 17/6/80)

June/80 the JSI is wary of the northeast coal deal because they believe the provincial government is pushing ahead on political, not economic, grounds; the JSI worries that BC may not be able to recover costs and requests firm cost figures on rail and other infrastructure (Sun, 26/6/80)

June/80 an independent analysis by Livernois, from UBC's Department of Economics, suggests the NECP will not be economically viable at prices less than \$71.00/MT (1980\$C); if capital costs are 20% higher than assumed in the analysis, the price will have to be \$79.00/MT; to generate an adequate return on capital invested in the mining sector, the venture will have to be subsidized by the governments if prices are lower or costs higher than assumed in the analysis (Livernois 1980)

June/80 debates rage in the Provincial Legislature regarding the viability of the NECP; Bennett responds

Mr. Speaker, the government of British Columbia is approaching this development as another stepping stone in the economic development of this province, returning to the

boldness of the sixties and the great two-river policy (Hansard, June 16 1980, 2852).

NECP will mean thousands of jobs for British Columbians both in the development of the infrastructure and in the private sector, particularly in the development of mines, for those who will work in facilities, whether its in transportation, mining of off-loading, and also the spinoff benefit of the multiplier effect on the number of other jobs that it will create for British Columbians and Canadians (Hansard, June 17 1980, 2878).

... because in fact the development of two outlets, two ports and two rail systems, will help the southeast as well as British Columbia and Canada. He must know the concern that has been expressed in dealing with Canada. They were vulnerable to a single transportation system, a single port system and a single area of coal development ... (Hansard, June 16 1980, 2852).

... this government told not only the companies in Japan but around the Pacific Rim also that British Columbia is politically stable and can be a secure supplier of resources, because we are prepared to step out and develop a second transportation system that will guarantee that security (Hansard, June 16 1980, 2852).

- July/80 coal company negotiators offer the JSI a price of about \$80.00/MT (Province, 10/7/80), but are unsuccessful (Sun, 3/7/80)
- July/80 HN Halvorson releases a report on the NECP that was commissioned by Council of Southeast BC Mayors; Halvorson also makes a presentation to the federal government's Standing Committee on Natural Resources and Public Works, arguing that 1) the Japanese have signed contracts far in excess of forecast consumption, 2) additional capacity required in western Canada by 1985 will be between 0.4 and 3.3 MMTPY, 3) southeastern BC coal mines are developing enough new capacity to meet this demand, and will do it at much lower cost than the northeastern mines (Halvorson 1980b)
- July/80 the JSI decides to send a trade mission to Canada to determine if Teck and Denison can become long-term suppliers; the JSI has doubts about their economic viability, and to date the companies have failed to clarify issues the JSI wants information on before it will sign a contract (Sun, 31/7/80)
- July/80 a consortium of 4 Brazilian and 9 Japanese steel mills approach southeastern BC coal mines to buy large amounts of coal; caused by Solidarity strikes in Poland and disrupted coal shipments (Catliff 1985; Sun, 19/8/80)
- Aug./80 the JSI counters the Teck and Denison offer of \$84.00-\$86.00/MT at \$75.00-77.00/MT FOB; the JSI expresses concern about the provincial government's interest in the project, the JSI is concerned it is getting too 'political' (Catliff 1985)

- Aug./80 the federal government refuses to pick up \$3.00/MT of the \$5.00/MT aid package proposed by BC to lower the price of northeast coal (Sun, 7/8/80)
- Aug./80 Hallbauer, Vice-President of Teck Corp., says the Australians are offering the JSI new coal supply at just under \$80.00/MT and the price Teck offered the JSI was about \$85.00/MT; Teck must knock off \$5.00/MT to get a contract with the JSI; reduction could be achieved by lowering inland freight rate and he suggests that the CNR's and BCR's targetted rate of return on capital, 20%, is too high; Hallbauer reports that Nemoto, Managing Director for NKK, will be in Vancouver August 20 for final negotiations (Globe and Mail, 16/8/80)
- Aug./80 the JSI begins to look more favourably at the northeast coal development; supplies from Australia were recently disrupted by docker's walkouts with the result that shipments from Australia were halved for two months; in addition, NSW mine owners announce they will not be able to meet contracted volumes because of insufficient port capacity in Australia (Sun, 19/8/80)
- Sept./80 in negotiations in late August, Nemoto asks the CNR to reduce its proposed freight rate by at least \$2/MT for the first 5 years; the price of coal and the cost of transportation are still concerns for the JSI (Sun, 9/9/80); Nemoto pushes for NECP deal within the JSI despite higher costs (Sun, 25/9/80)
- late 1980 demand forecasts improve for steel and metallurgical coal; report after report forecasts increasing demand in 1982; a trade mission to BC from Japan announces the JSI needs a contract for the NECP soon and wants to finalize a deal to guarantee deliveries by mid-1980s; Australian and Polish supply disruptions force the JSI to go to spot market in Canada and the US, where prices are very high (Catliff 1985)
- Nov./80 the JSI decides to delay the decision on the NECP for 6 to 12 months until additional information is available that will allay fears of price escalation; QCL contract price currently pegged for first 18 months only, and the JSI wants assurances that production costs will not rise dramatically after this period (Sun, 14/11/80); the JSI wants a longer period of firm prices in the QCL contract (Sun, 19/11/80); the mining companies want more equity investment from the JSI in return for a longer guaranteed price term (Catliff 1985)
- Nov./80 the JSI membership cannot agree on questions of long-term purchases of new, untested sources of coking coal, nor on forecasts of JSI steel production (Sun, 19/11/80); Australian strikes end, Japanese steel forecasts start to shrink; the JSI mills adopt a tougher bargaining stance, and want to postpone the NECP deal for two years; Phillips responds that he cannot guarantee the same conditions at that time and sets a Jan. 20/81 deadline for a response from the JSI (Catliff 1985)
- 1981 Balmer Mines receives \$66.98/MT FOB (\$60.42/MT 1980\$C) for metallurgical coal, an increase of \$4.04/MT from the 1980 price (Horie 1988)

- Jan./81 agreement on the NECP reached; breakthrough caused by increase in tonnage taken from QCL by JSI - back to 5 MMTPY of metallurgical coal (Sun, 24/1/81)
- Jan./81 BC's Ministry of Industry and Small Business Development (MISBD) recommends re-establishment of the Cabinet Committee on Coal, and creation of the North East Coal Development Office (NECDO) to coordinate construction; major responsibilities of NECDO are managing the overall project construction by coordinating the various participants, and negotiating provincial legal agreements with the various participants (Prince and Doern 1985)
- Jan./81 opposition parties argue the NECP is being subsidized and that BC taxpayers are subsidizing the JSI's strategy of lessening its dependence on Australian suppliers (Sun, 28/1/81); argue the NECP could cost taxpayers as much as \$1 billion (Province, 30/1/81)
- Jan./81 the Chairman of BC's Coal Guidelines Steering Committee says BC is putting the cart before the horse by approving coal sales before the mines' design and environmental plans have been reviewed and approved; neither Teck nor Denison have had Stage II proposals approved yet (Sun, 31/1/81)
- Feb./81 final contract signing being delayed by negotiations over the content of the price escalation clause (Sun, 7/2/81)
- Feb./81 some residents in northeastern BC ask for a public hearing; are doubtful of population projections for Tumbler Ridge and unsure of benefits of development for region (Province, 8/2/81)
- Feb./81 confidential documents leaked to press reveal that the provincial Cabinet approved early development of the NECP despite advice that project costs might escalate uncontrollably if the project pushed ahead; Dalcour Group, chief consultant on project scheduling recommended delay of six months in start-up date to August 1984 to control costs (Province, 10/2/81)
- Feb./81 critics of the NECP argue the federal government will not lose any money on the deal, but that the BC government probably will; argue justification that it will open up new area of province to resource exploitation seems unsupportable; private forestry surveys suggest area is already being harvested at close to sustainable yield, minerals besides coal are not abundant, natural gas is already routed through pipelines, spinoffs in equipment purchase will occur in the United States, and servicing will be done out of Edmonton; in addition, there was a cheaper alternate route for the BCR spur line, coming down into coalfields from Chetwynd (Province, 10/2/81)
- Feb./81 protocol agreement between the JSI, the coal companies and the Canadian governments signed; participants note that there remains a lot of work to do as there is still no firm decision on the price escalation clause and no contracts between the coal companies and the JSI (Sun, 11/2/81)
- Feb./81 BC's Minister of Environment, in a letter to Denison, says some permits may be issued to the mining company before Denison's deficiencies in its Stage II proposal are corrected (Sun, 12/2/81)

- Feb./81 the Province announces there will be no public hearings for the NECP, thus bypassing the Utilities Commission Act (Province, 15/2/81)
- early/81 wrangling continues between the Province and the Government of Canada regarding infrastructure funding (Catliff 1985)
- Feb./81 Ron Basford is appointed as Director of the North East Coal Development Office (Sun, 24/2/81)
- March/81 Phillips refuses to release Province's benefit-cost study of the NECP, saying it is not finished; two other studies on world supply and demand also being withheld (Sun, 27/3/81); Subsidiary Agreement to Evaluate North East Coal and Related Developments extended to March 31, 1982
- Apr./81 Leggatt, MLA for a Lower Mainland constituency, in a letter to the Editor of The Province newspaper, says that Phillips has agreed that the Province's investment in the NECP is not economically viable unless 11 MMTPY is shipped over the rail line; Leggatt also refers to Halvorson's study saying that forecasts of JSI metallurgical coal requirements do not indicate any need for new supply; concludes that Phillips's positive thinking may be unwarranted optimism (Province, 7/4/81)
- Apr./81 a conference is held at SFU on the economic viability of the NECP; the majority of the participants emphasize that the NECP is risky and likely uneconomic (Province, 12/4/81)
- Apr./81 Price Waterhouse study of the NECP, completed for QCL and Teck, suggests the Province will get substantial net financial returns and enormous employment benefits (Price Waterhouse 1981)
- Apr./81 Pat Walsh, newly appointed Mayor of Tumbler Ridge, says
 ... if you want to know what was happening behind the scenes, the Japanese insisted on the Anzac route and on the townsite because their number one concern is with security of supply. When the crunch comes and the price of coal goes down, they know that, before the government closes down a town or writes off the project, it will subsidize the freight rates ... When they have us hooked on the line, they will pressure us on price. (Globe and Mail, 15/4/81)
- May/81 in the BC Legislature, Phillips tables 100 studies completed on the NECP since 1975 (see Appendix 3B for a list), but the cost-benefit analysis of project is not included (Province, 29/5/81)
- June/81 coal companies still have no agreement with the NHB regarding port charges for coal; contract to build and operate port has not been awarded; Denison and Teck threaten to build a port in Kitimat (Sun, 24/6/81)
- June/81 changes to provincial legislation governing the BC Railway allow the BCR to raise the extra capital funds required to finance the Anzac spur line (Sun, 26/6/81)

- July/81 formal sales contracts between the coal companies and the JSI are signed; QCL receives a letter of intent from Japanese companies to purchase 1 MMPTY of thermal coal (Malkinson and Wakabayashi 1982)
- July/81 Province releases its regional impact analysis of the NECP (BC 1981c); the study estimates that 5000 new jobs will be created in the northeast by 1987, and that 10,000 people will move to the region
- summer/81 Province organizes a community consultation process for northeastern BC; the Regional Impact Consultation Committee visits with community leaders and elected representatives to discuss report on regional impacts (BC 1981d)
- summer/81 first construction contracts are let on the NECP (Malkinson and Wakabayashi 1982); coal companies submit their Stage II impact assessments to Coal Guidelines process (Catliff 1985)
- Sept./81 Bennett warns that if the federal government does not get going with the Ridley Island port development, the provincial government will build its own port on Kaien Island (Globe and Mail, 16/9/81)
- Sept./81 Basford and Phillips decide to go to Japan to discuss the current status of the NECP with the JSI (Sun, 22/9/81)
- Nov./81 port charge negotiations between the coal companies and the company awarded the contract to build the coal terminal are stalemated; BCR is withholding awarding 4 major tunnel contracts on the Anzac spur line because there is no agreement on the port component, but says the contracts must be let by November 25/81 to allow the contractors to meet the project management deadlines; to resolve the deadlock, the federal government offers to build the terminal itself rather than through a joint venture; the new corporate structure allows low port charges to be offered to companies (Financial Post, 14/11/81)
- Dec./81 agreement on coal handling charges reached (Sun, 4/12/81); QCL and Teck now can seek financing for the mine components of the NECP (Province, 6/12/81); tunnel contracts on Anzac spur line awarded (Province, 9/12/81)
- 1982 Balmer Mines receives \$82.63/MT FOB (\$68.58/MT 1980\$C) for metallurgical coal, an increase of \$15.65/MT from the 1981 price (Horie 1988)
- Jan./82 British Petroleum abandons the Sukunka project in northeastern BC because of the poor economic outlook, particularly insufficient markets, high interest rates and uncertainty over Ridley Island (Province, 29/1/82)
- Feb./82 the contract to build coal stacker at Ridley Island is awarded to Japanese companies; the NHB chose these firms rather than Ontario-based US subsidiary because latter's bid was based on untested German technology and NHB unwilling to risk potential problems (Province, 28/2/82)
- Feb./82 Phillips argues

... the Japanese steel industry is paying to open up the north ... paying for a new port, paying for upgrading the railway, paying for the branchline. And we will have it left for us for other economic development. Northeast Coal is no giveaway to the Japanese steel industry. The infrastructure, the new transportation system, the new port will pave the way for future economic development and trade on the backs of the Japanese steel industry. (Province, 28/2/82)

- summer/82 the JSI is still bullish regarding the NECP; most coal ports that supply Japan are congested with traffic (Catliff 1985)
- June/82 Esso Resources decides to drop out of the QCL deal and offers its equity to the other partners; Japan's Ministry of Industry, Trade and Investment (MITI) says the JSI will get more involved in the NECP; Nissho Iwai buys 10% of Bullmoose and the JSI takes 10% of QCL; the Japanese Steel Federation throws its support behind the NECP, enabling QCL to borrow \$950 million, mostly from Japanese banks and at a very favourable interest rate (8.5% compared to about 16% in Canadian financial market); \$1 billion financing package for QCL announced (Catliff 1985)
- July/82 Province releases Benefit-Cost Analysis (BC 1982a)
- July/82 the JSI begins negotiations to cut back on short-term contracts with coal mines in southeast BC; the JSI over-purchased on the spot market in anticipation of Australian labour strikes that did not materialize (Sun, 25/8/82)
- Nov./82 the smaller Japanese steel mills balk at investing money in QCL; completion of the \$1.3 billion financing package delayed (Sun, 26/11/82)
- 1983 Balmer Mines receives \$69.83/MT FOB (\$55.24/MT 1980\$C) for metallurgical coal, a decrease of \$12.80/MT from the 1982 price (Horie 1988)
- Jan./83 financing deal for mines completed; some Japanese steel officials are very unhappy about committing to a big contract when the JSI is trying to cut back on supply (Sun, 13/1/83)
- March/83 the JSI achieve price and volume cuts with South African, US, Chinese and Australian coal suppliers, and want the same from Canadian suppliers (Province, 10/3/83; Sun, 29/3/83)
- Apr./83 HN Halvorson, in an essay in the Sun, argues that the BC government is subsidizing northeast coal production by \$120.00 per annual tonne, and compares the optimism of BC government forecasts of future coal demand with pessimistic Japanese forecasts; Halvorson suggests the NECP is in big trouble (Sun, 21/4/83)
- Apr./83 two southeastern coal mines accept price cuts of \$14/MT and volume cuts of approximately 30% (Sun, 15/4/83)

- May/83 the BC government transfers \$470 million out of general revenue to BC Railway to retire the Crown Corporation's historic debt; the amount nearly matches the cost of the Anzac spur line, and triples the provincial deficit (BC Business, April 1986)
- fall/83 QCL and BOC move into production of coal
- Nov./83 first coal trains are loaded at mine sites and depart for Ridley Island
- Nov./83 Phillips, Bennett and provincial government officials maintain the northeast contracts are untouchable and will never be cut (Sun, 10/11/83)
- 1984 Balmer Mines receives \$69.09/MT (\$52.79/MT 1980\$C) for metallurgical coal, a decrease of \$0.74 from the 1983 price (Horie 1988)
- Jan./84 the first coal is picked up in Prince Rupert by a Japanese ship (Sun, 9/1/84)
- Feb./84 the financial consortium that provided the mine financing hires a securities firm to assess the viability of the NECP; Geoff Carter's report suggests the coal companies will sustain losses of nearly \$1 billion if prices are cut by \$14/MT and volume by 30% (Sun, 3/2/84)
- June/84 the official opening of the NECP; the JSI admits it wants a price review (Sun, 8/6/84)
- 1984 Nemoto of NKK demoted from position as Managing Director and lead negotiator; the JSI bring in Teranishi as new bargaining agent for the JSI with its Canadian suppliers; Teranishi fresh from Australian negotiations where significant price and volume cuts were achieved, although negotiations were bitter (Catliff 1985)
- Oct./84 BOC accepts a price cut of \$10/MT, but receives higher volumes in return (Globe and Mail, 13/10/84)
- 1985 Balmer Mines receives \$69.09/MT FOB (\$51.20 1980\$C) for metallurgical coal, no change from the 1984 price (Horie 1988)
- Jan./85 Denison's annual report confirms rumours about start-up difficulties at QCL, high ash content of coal, and financial problems; QCL's production 22% under target; QCL owes BCR and CNR about \$2 million in freight charges and Ridley Terminals about \$3 million (Sun, 10/1/85); QCL in danger of defaulting on its \$700 million loan (Sun, 7/2/85)
- March/85 Phillips admits "the hole is in the wrong place" for the QCL project (Hansard, 18 March 1985); QCL's financiers retain another consulting firm to investigate QCL's financial position; QCL accepts a price cut to \$91.50/MT; management shakeup occurs at Denison and QCL (Globe and Mail, 20/3/85)
- May/85 former Chief Geologist with the provincial Ministry of Energy, Mines and Petroleum Resources reports that exploratory drilling on the QCL properties was insufficient in his opinion; Ministry criticized QCL at the time but more intensive drilling was not completed (Globe and Mail, 9/5/85)

- July/85 QCL announces plans for a new coal pit, subject to obtaining financing of \$25 - 50 million (Sun, 10/7/85)
- July/85 Denison releases its semi-annual report, which indicates QCL lost \$15.6 million in the first three months of the 1985 fiscal year (Globe and Mail, 18/7/85)
- 1986 Balmer Mines receives \$68.05/MT FOB (\$48.32/MT 1980\$C) for metallurgical coal, a decrease of \$1.04/MT from the 1985 price (Horie 1988)
- Jan./86 Denison writes off its \$240 million equity investment in QCL (BC Business, April 1986)
- 1987 Balmer Mines receives \$58.34/MT FOB (\$40.02/MT 1980\$C) for metallurgical coal, a decrease of \$9.71/MT from the 1986 price (Horie 1988)
- Apr./87 QCL and the JSI are unable to agree on new base price for contract; deadline for price agreement extended to June 30
- June/87 deadline for price agreement between the JSI and QCL extended to September 30
- Oct./87 deadline for price agreement between the JSI and QCL extended to November 15
- Nov./87 the JSI initiates binding arbitration proceeding; nominates Normal Anderson as its representative on three-member arbitration panel
- Jan./88 QCL nominates Chester Johnson as its representative on the arbitration panel; QCL and the JSI unable to agree on a third member
- Feb./88 the JSI asks the Chief Justice of the BC Supreme Court to appoint a third arbitrator
- March/88 BC Chief Justice names Nathaniel Nemetz as third arbitrator
- Sept./88 Arbitration proceedings begin
- June/90 Arbitration decision reached: QCL ordered to reduce 1988 price to \$95.47/MT, 1989 price to \$93.69/MT and 1990 price to \$94.90/MT; as of July 1, 1990 price will drop to approximately \$84.40/MT; decision means QCL must pay the JSI \$46 million in overpayments (Globe and Mail, 30/5/90); BC Court awards QCL protection from creditors for six months to allow QCL to complete a reorganization plan (Globe and Mail, 13/6/90).

APPENDIX 3B

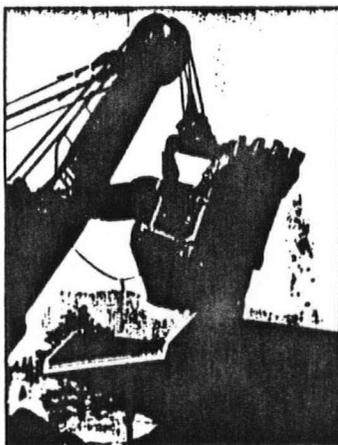
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3. Townsite/Community Development Subcommittee on North East Coal Development, North East Coal Study - Preliminary Feasibility Report on Townsite Community Development, 116 pages.
4. Manpower Subcommittee on North East Coal Development, Report of the British Columbia Manpower Subcommittee on North East Coal Development, 270 pages.
5. Cornerstone Planning Group, North East Coal Employment Survey, prepared for the Manpower Subcommittee on North East Coal Developments, 100 pages.
6. Suzanne Veit and Associates, Women in Mining - An Exploratory Study, prepared for the Manpower Subcommittee on North East Coal Developments, 114 pages.
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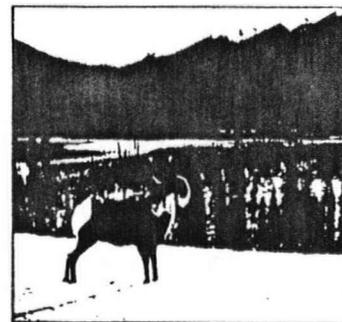
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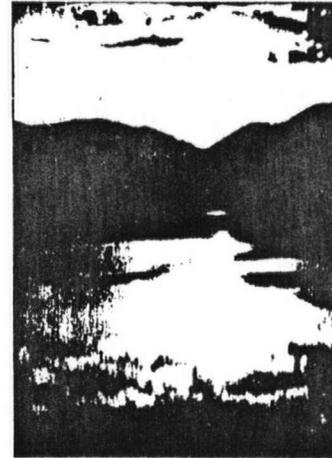
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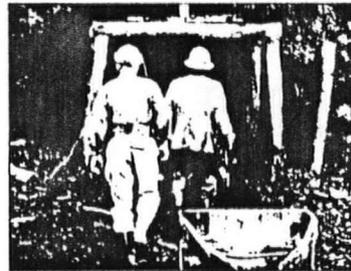
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Government Agent
Box 5016 - 50th Street
Chetwynd, British Columbia
V0C 1J0

Vancouver Public Library
750 Burrard Street
Vancouver, British Columbia
V6Z 1X5

Prince George Public Library
425 Brunswick Street
Prince George, British Columbia
V2L 2B7

Dawson Creek Public Library
1001 - 107 A Avenue
Dawson Creek, British Columbia

Prince Rupert Public Library
101 - 6th Avenue West
Prince Rupert, British Columbia
V8T 1Y9

Ministry of Industry and Small Business Development
6th Floor, 1405 Douglas Street
Victoria, British Columbia
V8V 1X4

Department of Regional Economic Expansion
Suite 600, 1175 Douglas Street
Victoria, British Columbia
V8W 2E1

Legislative Library
Parliament Buildings
Victoria, British Columbia
V8V 1X4

Parliamentary Library
Parliament Buildings
Ottawa, Ontario
K1A 0M4

APPENDIX 4A

REGIONAL ECONOMIC IMPACT ANALYSIS USING EMPLOYMENT MULTIPLIERS:

THEORETICAL BASIS AND EMPIRICAL ESTIMATION

Introduction

Completing an impact analysis of a project consists of three general steps. First, a baseline, without-project projection of the conditions of interest in the study area is made. Then the impacts of the project or program on these conditions are estimated. Finally, these impacts are joined with the baseline projection to produce a new statement about these conditions in the study area should the project go ahead. In regional economic impact analysis, the conditions of interest are usually employment and population impacts, and the baseline projections are often completed by assuming historical patterns will continue in the region. In remote or rural regions, the impacts of the project are usually projected using multipliers. One technique suited to constructing multipliers in such a situation is economic base analysis. Through economic base analysis an employment multiplier can be constructed.

Theoretical Basis of Employment Multipliers

Regional economic activity can be measured in a number of ways. In this discussion it will be defined as regional income, which is generally considered to be equal to:

$$Y = C + I + G + E - M \quad (1)$$

where

- C is consumption
- I is investment
- G is government spending
- E is exports, and
- M is imports.

Economic base analysis can be used to project the change in total employment resulting from an increase in exports from the region. The technique focuses on the relationship between economic activity in the basic and non-basic sectors in a regional economy, usually using employment figures as a proxy for economic activity levels. All activity which serves the export market is defined as the **basic sector (B)**, and all activity which serves the local market is defined as the **non-basic sector (NB)**.¹ Distinguishing between these two sectors requires a more rigorous definition of basic activity. Those firms that produce, transfer and distribute goods and services whose final market is outside the region are considered to be in the basic sector. The key phrase is 'final market'; it means that all firms who produce, transfer and distribute intermediate goods and services that are incorporated into goods or services that are exported are included in the basic sector.²

¹ This sector has a variety of titles in the literature, including non-basic, residentiary, service and local.

² Massey (1973) and others have criticized this definition because it can be logically extended to include every firm in the region. This is rectified by including the idea of technical and consumption linkages. Thus the basic sector is defined by all firms who produce, transfer or distribute goods and services destined for export markets, and those

Briefly, the analyst begins by assigning existing employment in the region to either the basic or non-basic sector using one of several possible sectoring methods. The total employment in each sector is calculated and the ratio of non-basic or total employment to basic employment derived. This ratio is then applied to the increase in basic jobs expected because of the increase in regional exports to yield either the total new non-basic jobs, or total new regional employment expected.

The simplicity of this technique and the reasonably good availability of statistical data on the distribution of the labour force across industries make economic base analysis a popular method of economic impact analysis. There are, however, numerous assumptions and complications which limit its validity and accuracy.

The major premise of economic base analysis is that the variable E, or exports, in equation (1) is the most important, in fact the **only**, variable determining Y, or regional income. The regional economy is divided into

$$Y = B + NB \quad (2)$$

Following from the premise that exports are the sole engine of regional economic growth, activity in the non-basic sector is deemed dependent on activity in the basic sector. This relationship is assumed to be constant over the period of analysis, such that

$$K_e = (B+NB)/B \quad (3)$$

therefore,

$$Y = K_e * B \quad (4)$$

Total regional income is thus dependent on the level of activity in the basic sector, and the economic base multiplier, K_e , describes the relationship. The multiplier's magnitude is determined by the characteristics of the spending and respending cycle that occurs within the regional economy. For example, if activity in the basic sector increased due to some increase in external demand for its products, the basic sector would pass on this stimulus to the non-based sector of the regional economy through its consumption linkages. The strength of these linkages is affected by the leakages from the regional economy in the form of imports, taxes, and savings. If leakages are high, the respending cycle will quickly attenuate and the multiplier will be small. If leakages from the regional economy are small, the multiplier will be larger.

Economic base analysis has five major assumptions.

- 1) By assuming exports are the sole source of economic growth, the technique ignores other possibilities, such as investment, government spending, and import substitution, and may overemphasize the future role of exports in the regional economy (Massey 1973, 4).
- 2) This technique assumes the basic sector is homogeneous. By positing a single multiplier relationship between the basic and non-basic sectors, economic base analysis ignores the possibility that export industries may have different consumption linkages.

firms which are technically linked to them. The non-basic sector is defined by consumption linkages where owners and employees spend wages and salaries on consumption goods.

- 3) The multiplier is assumed to remain constant during the period of the impact analysis. This ignores the possibility of productivity changes in either sector, or import substitution activities, both of which would change the employment ratio between the basic and non-basic sectors. Consequently, the period over which impacts are projected must be short, and the changes in activity levels in the basic sector should be marginal changes only.
- 4) Economic base analysis assumes there is no interregional feedback resulting from increased export levels.³ To the extent there is interregional feedback, impacts will be understated.
- 5) This technique assumes there are no capacity constraints within the region, and so the stimulus generates growth and not inflation.

These assumptions suggest that economic base analysis is best suited to analysis of marginal shifts in the existing export industries of small regional economies where exports dominate the regional growth process. It could be extended to the analysis of impacts associated with new industries if the new industries have similar consumption linkages to the existing basic industries. Finally, it is best to use economic base analysis for short-term (less than 5 year) projections only.

Several practical difficulties face the use of economic base analysis in impact analysis.

- 1) The unit of measurement, although potentially including indicators such as output and value added, is generally employment. There are several problems associated with the use of jobs. One, jobs are not an excellent proxy for economic growth. There can be increases in productivity produced by the substitution of capital for labour in a basic industry which, while potentially increasing regional income, leads to a decline in the number of jobs in the basic sector. A second problem associated with the use of jobs is adjusting employment figures to equal full time equivalents. This adjustment should deal with part-time and seasonal jobs, and differences in wage rates in the basic sector. Finally, information on employment by industry is not published in Canada; one must use experienced labour force by industry data, which includes employed and unemployed individuals and could lead to some bias in the multiplier estimate if unemployment is not equally distributed across industrial sectors.
- 2) The technique assumes the economy moves from one equilibrium position (pre-stimulus) to another (post-stimulus). If the economy was not in equilibrium pre-stimulus, the data collected on employment levels in the two sectors of the economy, and the multiplier constructed may be in error. In addition, the analysis provides little insight on the nature or duration of any lags to expect.⁴

³ Interregional feedback occurs when the extra regional income produced by increased exports results in increased imports from other regions, which increases their regional incomes and potentially further increases their demand for exports from the first region.

⁴ Richardson (1985, 635) suggests lags will vary between and within sectors over time, depending on factors such as capacity constraints, inventory management, and firms' policies. Mulligan and Gibson (1984, 225) argue lags are one of the important issues in economic base analysis that relatively little is known about. They suggest that in addition to capacity constraints, the composition of the shifting basic activity, the direction of the shift, and the responsiveness of migration and labour force participation to regional changes in wage levels and job vacancies likely play an important role in determining the nature and length of lags. Gunton (pers. comm.) suggests expectations can also play a

- 3) Usually, public and private transfer payments are ignored (Gibson and Worden 1981, 146), and consequently the technique often overestimates multipliers.⁵ If transfer payments play a role in the regional economy, as they do in most Canadian regions, some of the non-basic sector employment will be linked to this income and not to the consumption of those employed in the basic sector. Estimates of private and public transfers into regional economies in Canada are available and can be used to overcome this practical difficulty with ease (Income Estimates for Sub-Provincial Areas, Statistics Canada Cat.#13-216).
- 4) Sectoring the economy is the most crucial and most controversial aspect of constructing an employment multiplier. It is difficult to correctly identify the basic sector so that all directly and indirectly exporting activity is included. The major sectoring alternatives are:

Assumptions, which rely on the analyst's in-depth knowledge of the regional economy to identify basic activity,

Survey, of all businesses and households to identify direct and indirect exports, which is expensive and time-consuming,

Location Quotient, which compares the regional and national economic structures to determine regional specializations; the specialized employment is assumed to be basic sector employment,

Minimum Requirements, which establishes minimum employment levels by industry for similar-sized region and equates any excess to basic sector employment, and

Econometric, which links basic sector employment to employment in the 'rest of the world' in a time-wise linear regression analysis, and predicts basic employment using this equation.

These alternatives, reviewed in detail by Isserman (1980), all have weaknesses and so the choice of an appropriate method can be difficult. Schwartz (1983), in his book A Guide to Regional Multiplier Estimation, argued that, for small regional economies in Canada, the best solution to the sectoring problem was to combine judgement with the location quotient technique. Flexibility in the choice of the reference area, and detailed experienced labour force by industry data (to 3-digit SIC) were strongly recommended in using the location quotient technique. This approach is reasonable, except for his adjustment procedure for transfer payments, which only included transfers to unemployed individuals and so still overestimated the multiplier. The alternative data source referred to in 3) above should be used instead.

part in shaping the nature of lags. Pessimistic expectations may weaken the response to a stimulus, and lengthen the lag; optimistic expectations may make lags short and responses strong.

⁵ In an empirical test of the significance of this effect, Gibson and Worden (1981, 152) found an average decline of 25% in multiplier estimates once they were adjusted for public transfers; the largest declines were in retirement communities, the smallest in 'heavy industry' communities. Smith et al. (1981) also found a strong upward bias in multiplier estimates if transfer payments are omitted from the basic sector calculations.

The conceptual and practical weaknesses of economic base analysis mean it is best suited to analysis of small regional economies with a narrow export base. In these economies autonomous investment is usually small, local interindustry linkages are minor, and import substitution possibilities are limited by the size of the market. But even further, this technique is best-suited to analysis of short-term, marginal changes in export levels which do not change the region's economic structure. Economic base analysis really gives very limited impact information, and when combined with its narrow conceptual basis, it is not surprising it has been strongly criticized for its lack of policy relevance (Massey 1973, 14). Nevertheless, it continues to be used in economic impact analysis.

Accuracy of projections made using economic base analysis will depend on the accuracy of the estimate of new basic jobs, the method and data used to sector the economy,⁶ the amount of excess capacity in the region, the nature of any lags, and the level of in-commuting. In addition, the number of jobs taken by regional residents versus in-migrants and the resulting population increase may affect the nature and level of regional non-basic activity. Finally, the ability of employment measures to capture increases in economic activity, including changes in the capital/labour ratios in the economy will affect the accuracy of the projections.

To summarize, economic base analysis has several important limitations. Employment is generally an insensitive proxy for economic activity levels, the methods available for sectoring the economy all have significant drawbacks, the multiplier is usually highly aggregated and insensitive, and the technique is based in a comparative statics model. Data on experienced labour force by industry should be disaggregated to the 3 digit SIC level and this can only be obtained by placing a special order with Statistics Canada which has temporal and financial costs. Finally, the multiplier should be adjusted for transfer payments entering the regional economy.

This appendix now turns to a discussion of various approaches to constructing employment multipliers, and provides details regarding data sources and methods for each approach. In general, these approaches are suitable for use in small regional or local economies that are not strongly influenced by, or are not in close proximity to, a metropolitan area.

Constructing Employment Multipliers using Economic Base Analysis

There are several approaches available for constructing employment multipliers. Most of these approaches are thoroughly discussed in the literature, but there is not one place where they are all examined together, complete with practical details on data sources, etc. Therefore this appendix should be useful to Canadian practitioners. For more details on the construction of employment multipliers, see Schwartz (1983), Gibson and Worden (1981), Mulligan and Gibson (1984), and Moore (1975).

This section will examine six approaches to constructing employment multipliers. All but the first and fifth focus on the data and techniques used to sector the economy into basic and non-basic activity. They are:

- 1) choosing a multiplier from published estimates,
- 2) using published Census information on experienced labour force by industry and a combination of judgement and location quotients to sector the data,

⁶ Or alternatively the assumptions and adjustments employed in choosing a published estimate from the literature.

- 3) using specially-ordered, more detailed Census information on experienced labour force by industry and a combination of judgement and location quotients to sector the data,
- 4) adjusting the results from 2) or 3) above for transfer payments, and
- 5) using a generalized minimum requirements estimate, based on Moore's (1975) equation.

The first approach reviewed here, and the one used by the BC government in its study of the regional employment and population impacts of the NECP (BC 1981c), is to choose a multiplier from a list of published estimates. The choice should be based on similarities between the region for which the published estimate was prepared and the study region. In the preceding section, it was suggested that an appropriate and defensible multiplier for the NECP would have been in the range of 1.4 to 1.6. This is reinforced by examining selected multiplier estimates that have been published since 1980, which are presented in Table 4A1.

TABLE 4A1
EMPLOYMENT MULTIPLIERS:
SELECTED PUBLISHED ESTIMATES, 1980-1984

Source	Project/Location	Multiplier
Murdock & Leistritz 1981	western rural USA multi-county areas with some jobs in neighboring counties	1.7-2.5
Gibson & Worden 1981	small towns in Arizona Pop. = 2,000-15,000 non-adjusted adj. for transfers adj. for transfers, wage differences & out-commuters	1.29-2.57 1.27-1.76 1.13-1.68
Gilmore et al. 1982	western rural USA sparsely settled areas moderately populated areas areas near metropolis	1.3-1.5 1.4-1.6 1.6-1.8
Schwartz 1983	Cape Breton, NS Labour force = 40,235	2.24
Ashcroft & Swales 1984	South Glamorgan, Wales Pop.(1971)=390,269 Cleveland, North Region Pop.(1971)=567,766 relocation of 4,020 and	1.71 1.66

3,000 civil service
jobs, respectively

If the analyst reviews a sufficient number of studies that provide a broad range of regional characteristics, there is a reasonable probability that a defensible multiplier will be chosen. However, because of the range in the published estimates it is also probable that different, yet equally defensible, multipliers could be chosen. In this case a high and a low estimate should be selected and used in providing a range of employment impacts.

The second approach is to use information on the distribution of the experienced labour force across various industries within the regional economy.⁷ This information is collected in the national Census and is published for most municipalities and rural areas in Canada.⁸ To sector the regional economy into basic and non-basic activity, an appropriate method for small rural areas in Canada is to combine judgement with the use of location quotients (Schwartz 1983). Using this approach and 1981 Census data for the NECP study region produced a multiplier estimate of 2.66. The details are presented below.

Primary Sector: assume all labour force is basic = 1,740

Secondary Sector: assume all labour force is basic, as most are in wood manufacturing = 920

Construction: use a location quotient to estimate the labour force in the basic sector, with Canada as the larger region = 494

Transportation, Communication and Utilities: use a location quotient to estimate the labour force in the basic sector, with Canada as the larger region = 615

Trade: use a location quotient to estimate the labour force in the basic sector, with Canada as the larger region = 301

Finance, Insurance and Real Estate: assume all labour force is in non-basic sector, and double check by comparing to provincial location quotient

Government: assume 0.67 of labour force are in the basic sector = 456 (assumes all federal and provincial government employment is in the basic sector)⁹

Services: assume all are in the non-basic sector.

$$K_e = 12,050/4,526 = 2.66$$

The employment multiplier estimated using this data source will probably be an overestimate because of the degree of aggregation in the industry codes. The estimate could be used as an upper bound, as recommended by Isserman (1977a), but it is probably not very useful on its own, particularly when it has not been adjusted for the impact of transfer payments.

The third approach to constructing an employment multiplier is to order more detailed data on the region's experienced labour force in various industry categories from Statistics Canada. The Census Custom Products Services in the Census Operations Division will

7 It is preferable to have information on employment by industry group, but this is not published by Statistics Canada.

8 To use this data in the NECP case, the study projecting the operational phase impacts would have to have been delayed approximately one year until the results of the 1981 Census became available.

9 This is likely an overestimate of basic sector employment within this industry category, as some of the federal and provincial employment will be oriented to non-basic activity.

provide data on the experienced labour force by industry to the 3-digit level of disaggregation in the Standard Industrial Code.¹⁰ There is a charge for this data (minimum of \$300.00), and a waiting time for the results (minimum of 4 weeks). This data was ordered and used to re-estimate the employment multiplier for the South Peace in 1981, again following Schwartz's (1983) recommended procedures. The multiplier estimate, unadjusted for transfer payments, was 2.44. Details of the sectoring procedures are not provided here as they are reviewed in Schwartz (1983).

Using the detailed industry data only produced a slight reduction in the employment multiplier for the South Peace region. This is not as significant as one might have expected given the money and time involved in obtaining the data. However, using this data does give the analyst more confidence in the results, and more familiarity with the local or regional economy. Whether the data is pursued will probably depend on how confident the analyst is with the results from the more aggregated, published data as an upper estimate.

The fourth approach is really a modification of the second and third, in that it makes an adjustment for transfer payments into the regional economy. The tendency for sectoring techniques to underestimate basic employment was reviewed in Chapter 4, and it was noted that one of the primary sources of underestimation was the difficulty of accounting for transfer payments into the regional economy, and their effect on total employment. Gibson and Worden (1981) found that, of the adjustments they tried, transfer payments had the largest effect on the employment multiplier estimate.¹¹

Statistics Canada publishes income estimates for sub-provincial areas (Catalogue #13-216) which divide total regional income into several categories, three of which are relevant to estimating transfer payments. The first is government transfer, which includes UIC benefits, social assistance payments, income supplements, child care allowances, etc. The second category is investment income which includes dividends, interest payments, etc. The third is miscellaneous money income which includes pensions, superannuation, and other payments such as rent from boarders, scholarship income and alimony payments. Using this data may slightly overestimate transfer payments into a regional economy because of the components of the latter category, but it is a reasonable estimate of total transfers into a regional economy. If this transfer income estimate is pro-rated to reflect the size of the study region population, and then divided by the average employment income in the region, the number of basic jobs represented by these transfer payments can be estimated. These can then be added to the previous estimate of basic employment and

10 More detailed data is possible, but the analyst must be careful of suppression difficulties experienced with small counts in data cells. In addition, published data for Canada and the provinces is only available at the 3-digit level (Statistics Canada, Industry Trends, 1986), so to keep costs down it is advised to only pursue disaggregation to the 3-digit SIC level. When ordering this information, the analyst must specify that it is the 1971 definition of the labour force, as well as the 1971 definition of the SIC, that is required. This will allow comparison with the Statistics Canada publication Industry Trends, and thus construction of location quotients without ordering national and provincial data.

11 Gibson and Worden (1981) also adjusted for part-time and seasonal employment, and out-commuting, but found these had a minor effect on the multiplier estimate compared to transfer payments. In their study region, part-time employment ranged between 15% and 20% of total employment. A 1979 survey of Chetwynd residents (BP Canada 1979) suggested that part-time employment ranged between 10% and 15% of total employment. If this is indicative of the South Peace economy, the Gibson and Worden results suggest it will not be a major factor in the employment multiplier calculations.

the multiplier recalculated. For the South Peace region, total transfer payments in 1981 were estimated at \$44,597,746, and average employment income reported in the Census for the region was \$15,106. Thus the transfer income represented 2,952 additional basic jobs. Adding these to the number of basic jobs estimated using the published, highly aggregated industry data reduced the multiplier estimate to 1.61. Adding these transfer income-related jobs to the number of basic jobs estimated using the specially-ordered, more detailed industry data reduced the multiplier estimate to 1.54.

The adjustment for transfer payments makes a large difference in the estimate of the employment multiplier and should be completed. Schwartz (1983) suggested an alternative way of making this adjustment, which was to estimate the number of unemployed people in the labour force and to add these to the number of basic jobs (assuming they are all receiving UIC benefits), but this will still underestimate total transfer income into the regional economy. The alternative proposed here is preferable.

The fifth approach is to adopt a minimum requirements approach to estimating an employment multiplier. For a quick estimate, Moore's (1975) equation, derived from US data for a large range of city sizes and shown to be very accurate for estimating employment multipliers for small towns in rural Arizona (Mulligan and Gibson 1984), can be applied. Using his formula, which only requires a population estimate for the study region, suggests the employment multiplier in the South Peace in 1981 was 1.67. Moore's formula is: $\Delta E = -20,36538 + 13.78340 \log(\text{population})$.

Isserman (1977a) suggests the minimum requirements technique may provide a reasonable lower bound estimate for the employment multiplier, but in this case it appears to closely match the employment multiplier estimated using a combination of judgement and location quotients, and adjusted for transfer payments. This suggests the Moore equation may provide an estimate that is still slightly high, given the tendency for location quotients to underestimate basic sector employment.

TABLE 4A2
EMPLOYMENT MULTIPLIER ESTIMATES
SOUTH PEACE REGION, 1981

Technique	Estimate
1) Pick one from published estimates	1.50
2) Assumptions + L.Q. (Division-level SIC)	2.66
3) Assumptions + L.Q. (3 digit SIC)	2.44
4) Assumptions + L.Q. + Transfers (3 digit SIC)	1.54
5) Minimum Requirements	1.67

(Moore equation)

Method number 4 in Table 4A2 was also used to estimate the 1986 employment multiplier for the South Peace region. The resulting estimate was 1.43.

Finally, an important issue in economic base analysis is estimate the change in basic sector employment. This is comprised of direct employment in the export industry, and indirect employment in businesses that supply goods and services to the export industry. Estimates of direct employment changes can be obtained from the project proponent. However, estimating indirect employment changes is more difficult. Knight (1990) proposes one method, which draws on income expenditure analysis, to overcome this difficulty. If the indirect employment changes are not included in the estimate of the change in basic sector employment, the total change in employment may be underestimated.

APPENDIX 5A

SUMMARY OF INTERVIEW RESULTS, COPIES OF INTERVIEW SCHEDULES, AND LIST OF INTERVIEWEES

In the first section of this appendix, the results of interviews with representatives of native and non-native existing communities, and businesses in the South Peace region are presented, followed by the general interview schedules and a list of interviewees. Note that while the interview schedules contained questions relating to the distribution of benefits and costs among groups within the communities, the interviewees did not find these questions easy to answer and many responded that they had no idea. Consequently, these questions were excluded from the analysis. The information obtained from the business interviews is presented in a separate table.

In the second section of this appendix, the results of interviews with Tumbler Ridge representatives are presented, followed by the interview schedule and a list of interviewees. Again, the information obtained from the business interviews is presented in a separate table. In final section, the results of interviews with mine purchasing and personnel managers are presented. This information was used to analyze the indirect employment in the South Peace region related to the mining activity.

Thanks to everyone who gave their time to participate in these interviews and this study.

A. NATIVE AND NON-NATIVE EXISTING COMMUNITIES

1. Summary of Interview Results

TABLE 5A1					
SUMMARY OF INTERVIEW RESULTS: REPRESENTATIVES OF EXISTING COMMUNITIES, SOUTH PEACE REGION, 1989					
Category of Benefit or Cost	% of Total Respondents				Sum
	D. Creek	Chetwynd	Rural	Native	
Benefits					
Direct Jobs to Locals					
a few or none	14	91	100	100	55
many	19	9	0	0	12
do not know	43	0	0	0	21
Commuters from Community					
a few or none	57	64	100	100	77
a lot	19	36	0	0	19
Indirect Jobs to Locals					
a few and concentrated	33	91	100	100	65
a lot	48	0	0	0	23
Training for Locals					
	19	0	33	25	16
Improved Entrepreneurship					
	48	0	0	0	23
Improved Infrastructure					
	33	36	66	0	30
Raised Profile					
	33	0	100	0	23
Greater Stability					
	33	91	100	0	47
More Opportunities for Young People					
	57	0	66	0	33
General Growth					
	0	36	66	0	14
Costs					
Financial/Tax Burden					
	62	27	100	0	44
Boom Effects					
inflation	38	64	0	38	42
pressure on services	10	36	0	0	14
Bust Effects					
excess capacity created when people moved to new town	14	100	0	0	33
Environmental or Social Disappointment					
	10	45	100	75	37
Disappointment					
no effect on unemployment	10	27	0	100	30
high expectations not met	81	100	0	100	84

TABLE 5A2
SUMMARY OF INTERVIEW RESULTS
BUSINESS REPRESENTATIVES, SOUTH PEACE REGION, 1989

Expenditure Category	Sourcing Pattern (% of total purchases or hiring)				Other
	South Peace	Edmonton/Grande Prairie	Vancouver		
Supplies	0	21	16	63	
Services	N/A	N/A	N/A	N/A	
Employees	95	0	0	5	

2. Copies of Interview Schedules

FOR CHETWYND, DAWSON CREEK, AND RURAL NON-NATIVE SETTLEMENTS

In this research we are trying to identify benefits received and costs borne by communities in the South Peace area as a result of the North East Coal Project. For example, we want to answer questions like:

how many people from your community work at the mine or in Tumbler Ridge, and do they live in Tumbler Ridge or in your community,

what kinds of goods and services are provided to Tumbler Ridge residents or the mines by businesses in your community, and

what kind of costs did or does your community bear because of the NECP.

We would like to get detailed information to the extent possible in each of the areas outlined below. We will be pleased to receive any information you can give us, so please don't feel uncomfortable if you cannot provide numerical data. We will be talking with many people in your community, and by doing so we hope to get the best information we can.

1. NAME, POSITION, LENGTH OF RESIDENCE

2. HAS YOUR COMMUNITY BENEFITTED FROM THE NORTH EAST COAL PROJECT

jobs

mining
supply industries
service industries

are these jobs in Tumbler Ridge or Chetwynd

were these benefits more or less than the community expected

has there been any change over time

(follow the same pattern with the categories below)

income
training
infrastructure (railway, highway upgrading, facility upgrading - hospital)
putting the region on the map for investors, entrepreneurs
stability
retaining young people
participation in community activities/projects

3. HAVE CERTAIN GROUPS IN YOUR COMMUNITY BENEFITTED MORE THAN OTHERS

local businesses / what kind
unemployed
youth
women
unskilled labour
certain occupational groups (lawyers, dentists, truck drivers)

4. WHAT HAVE THE COSTS BEEN TO YOUR COMMUNITY

pollution/environmental degradation
inflation
pressure on services
community disruption
underused infrastructure
other

were these more or less than the community expected

any costs that were unexpected or that did not happen

duration over time

5. HAVE CERTAIN GROUPS IN YOUR COMMUNITY BORNE MORE OF THE COSTS THAN OTHERS

local businesses / what kind
 unemployed
 youth
 women
 unskilled labour
 retired people
 certain occupational groups (lawyers, dentists, truck drivers)

6. WOULD YOUR COMMUNITY HAVE BEEN BETTER OFF WITHOUT THE PROJECT

7. ARE THERE ANY REPORTS YOU KNOW OF THAT MIGHT BE HELPFUL TO US

8. IS THERE ONE OTHER KNOWLEDGEABLE PERSON WE SHOULD TALK TO IN THIS COMMUNITY

9. FOR LOCAL BUSINESSES, HOW IMPORTANT ARE THE MINES, OR THE PEOPLE LIVING IN TUMBLER RIDGE, TO YOUR BUSINESS (CAN ALSO ASK THIS QUESTION BY ASKING WHAT WOULD HAPPEN TO THEIR BUSINESS IF THE MINES CLOSED DOWN)

proportion of annual, monthly or weekly sales
 proportion of employment
 any other benefits (eg. entrepreneurial improvements)

10. FOR LOCAL BUSINESSES, WHERE ARE THE FOLLOWING PURCHASES MADE OR SERVICES OBTAINED, AND MORE SPECIFICALLY WHERE DO GOODS AND/OR SERVICES SUPPLIED TO THE MINES OR TUMBLER RIDGE RESIDENTS COME FROM (IF FROM OUTSIDE THE AREA, HOW DO THEY GET TO YOUR COMMUNITY)

inventory
 supplies
 parts and materials
 fuel
 capital expenditures (vehicles, office furniture)
 management
 financial/legal advice
 banking/insurance
 other

changing pattern over time?

11. IN THE LOCAL BUSINESSES, HOW MANY PEOPLE FROM THE AREA WERE HIRED RELATED TO THE NECP

CAN YOU ESTIMATE HOW MANY WERE

Natives/ from which community
 women/ from which community
 farmers/ from which area
 new labour force entrants/ from which community
 school-leavers/ from which community
 previously unemployed/ from which community

FOR NATIVE COMMUNITIES

In this research we are trying to identify benefits received and costs borne by communities in the South Peace area as a result of the North East Coal Project. In particular, we want to answer questions like:

how many people from your community work at the mine or in Tumbler Ridge, and do they live in Tumbler Ridge or in your community, and

what kind of costs did or does your community bear because of the NECP.

We would like to get detailed information to the extent possible in each of the areas outlined below. We will be pleased to receive any information you can give us, so please don't feel uncomfortable if you cannot provide numerical data. We will be talking with many people in your community, and by doing so we hope to get the best information we can.

1. NAME, POSITION, LENGTH OF RESIDENCE

2. HOW MANY COMMUNITY MEMBERS HAVE JOBS IN TUMBLER RIDGE

at the mine
 elsewhere in Tumbler Ridge
 characteristics of members (women, skilled, Band members)
 kind of job
 training required & completed
 increasing or decreasing number
 do they stay in the job
 average length of time in job
 do they commute
 after leaving, what do they do (return to reserve, work seasonally in industry)

how does this compare to the community's expectations about the North East Coal Project (were more or less benefits expected)

3. HAS YOUR COMMUNITY EXPERIENCED ANY OTHER BENEFITS FROM THE NORTH EAST COAL PROJECT

guiding activity for fishing or hunting for people from Tumbler Ridge
other

4. WHAT HAVE THE COSTS BEEN TO YOUR COMMUNITY

pollution/environmental degradation
inflation
pressure on services
community disruption
underused infrastructure
other

duration over time

how does this compare to the community's expectations about the North East Coal Project (were more or less costs expected)

5. ARE THERE ANY REPORTS YOU KNOW OF THAT WOULD BE USEFUL FOR US TO LOOK AT

6. IS THERE ONE OTHER KNOWLEDGEABLE PERSON IN THIS COMMUNITY WE SHOULD TALK TO

3. List of Interviewees

Dawson Creek:

Mr. Bob Trail, Mayor
Mr. Harald Hansen, City Administrator
Mrs. Elaine Peterson, Economic Development Co-ordinator, Dawson Creek
Economic Development Commission
Mrs. Barbara Berry, Manager, Dawson Creek and District Chamber of Commerce
Mr. Jim Inkster, Inland Auto Centre
Mr. Larry Stefanyk, Northern Metallic Sales Ltd.
Mr. Ray Gerein, Branch Manager, Finning Ltd.
Mr. Gene Kazakoff, Terminal Manager, Canadian Freightways Ltd.
Mr. Ken Bocking, General Manager, Dawson Co-operative Union
Mr. Laurie Davie, Manager of Dawson Mall
Mr. George Richmond, Tiger Stationery
Mr. Tom Lunnin, Manager, Safeway
Mr. Ken Lederhouse, Manager, K-Mart
Mr. Joe Delawsky, Ru-Cels Ladies Wear and Gift Shop
Eight merchants from the Dawson Mall, including M. Lang from "Looking Good",
R. Cronier from "Sanns", B. Landuch from "Barbara's Flowers", I. Loberg
from "The Morning Cup", Terry and Judy from "Toys and Wheels".

Chetwynd:

Mr. Charles Lasser, Mayor
 Mr. Bob Nicholson, Alderman
 Mrs. Dianne Kunz, Deputy Clerk
 Mrs. Betty Deck, Economic Development Co-ordinator
 Mrs. Barbara Shirley, Manager, Chetwynd Chamber of Commerce
 Mrs. Marion Hoover, Chetwynd Department Store and Ty Cobbs Mens Wear
 Ms. Ruth Torgerson, Publisher, The Pioneer News
 Mr. Randy Hill, Editor, The Pioneer News
 Mr. Glen Earl, Manager, Shaw Sales
 Ms. Maureen Gammon, Editor and Publisher, Chetwynd Echo
 "Blackie", Peace Country Rentals

Native Communities

Mr. Keith Hall, Executive Director, Nawican Friendship Centre, Dawson Creek
 Mr. Clifford Calliou, Kelly Lake
 Chief John Dokkie, West Moberly Band
 Mr. Dean Dokkie, Former Band Manager, West Moberly Band
 Chief Jack Davis, Sauteaux Band
 Mr. Brian Dejerlais, Band Manager Trainee, Sauteaux Band
 Ms. Amy Gauthier, Band Manager Trainee, Sauteaux Band
 Ms. Caroline McGinnis, Executive Director, Tansi Friendship Centre, Chetwynd
 Mr. Elvin Calahaisen, Assistant to Executive Director, Tansi Friendship Centre,
 Chetwynd

Non-Native Rural Communities

Mr. Ben Knutson, Chair, Peace River Regional District
 Mr. Albin Pierce, Regional District Representative for Dawson Creek
 Unincorporated Area
 Mr. Jack Hannam, Regional District Representative for Chetwynd Unincorporated
 Area

B. TUMBLER RIDGE

1. Summary of Interview Results

TABLE 5A3	
SUMMARY OF INTERVIEW RESULTS TUMBLER RIDGE REPRESENTATIVES, 1989	
	% of respondents
Where did people come from?	
other mining communities in eastern Canada, the North and BC	79
N/A	21
How long do people stay?	
3-5 years	67
N/A	33
How many people commute to work in Tumbler Ridge or at the mines?	
only a few (<20)	29
decreasing but still >20	25
many (>100)	21
N/A	25
Where do Tumbler Ridge residents shop? for groceries	
in town except for meat	33
out of town	38
N/A	29
for clothing	
in the South Peace or Grande Prairie	67
in town or through Sears	33
N/A	0
for household items	
in town	33
in Dawson Creek	33
in Grande Prairie	33
N/A	0
for cars	
in Dawson Creek	33
in Edmonton	12
N/A	55
Where do Tumbler Ridge residents obtain Medical services	
in town except for maternity	40
N/A	60
Dental services	
in town	17
in other South Peace community	12
N/A	71
Banking/Insurance/Legal	
in town	33
in another South Peace community	54
N/A	13

TABLE 5A4
SUMMARY OF INTERVIEW RESULTS
BUSINESS REPRESENTATIVES, TUMBLER RIDGE, 1989

Expenditure Category	Sourcing Pattern (% of total purchases or hiring)			
	South Peace	Edmonton/Grande Prairie	Vancouver	Other
Supplies	67	16.5	16.5	0
Services	67	0	0	33
Employees	50	0	0	50

2. Interview Schedule

In this research we are trying to identify benefits received and costs borne by communities in the South Peace area as a result of the North East Coal Project. In particular, we want to answer questions like:

how many people from the area work at the mine or in Tumbler Ridge, and do they live in Tumbler Ridge or another community,

how much do people from Tumbler Ridge spend when they shop in the area's other communities and what do they buy,

how much do local businesses buy from other businesses in the area, and what kinds of items or services are involved, and where were employees from, and

what kinds of services are provided to Tumbler Ridge residents by businesses in the area's other communities.

We would like to get detailed information to the extent possible in each of the areas outlined below. We will be pleased to receive any information you can give us, so please don't feel uncomfortable if you cannot provide numerical data. We will be talking with many people in your community, and by doing so we hope to get the best information we can.

1. NAME, POSITION, LENGTH OF RESIDENCE

2. WHERE DID PEOPLE IN TUMBLER RIDGE COME FROM

other communities in the area/which ones most important
other communities in B.C. interior
Lower Mainland or Vancouver Island
Western Canada
elsewhere

changing pattern over time?

3. HOW LONG DO PEOPLE USUALLY STAY IN TUMBLER RIDGE

any relationship to demographic characteristics (single male argument)

changing pattern over time?

4. DO MOST PEOPLE WHO WORK IN TUMBLER RIDGE LIVE HERE

miners/ if not, where
tradespeople/ if not, where
business services/ if not, where
community services/ if not, where
personal services/ if not, where

changing pattern over time?

5. WHERE DO PEOPLE FROM TUMBLER RIDGE SHOP

food
clothing
major appliances/furnishings
other (alcohol, tobacco, automobiles)

changing pattern over time?

6. WHERE DO PEOPLE FROM TUMBLER RIDGE OBTAIN

dental care
health care
banking/insurance/financial services
post office

changing pattern over time?

7. WHAT DO PEOPLE DO WITH THEIR LEISURE TIME

evenings/daytimes/ where
weekends/days off/ where
holidays/ where

8. WHAT ARE THE BAD THINGS ABOUT LIVING IN TUMBLER RIDGE
- are there things missing, services, shops
are the people non-sympatico
- changing pattern over time?
9. WHAT ARE THE GOOD THINGS ABOUT LIVING IN TUMBLER RIDGE
- is it a great place to live
what makes it great (lots to do, people visit)
is it a nice community
- changing pattern over time?
10. FOR LOCAL BUSINESSES (EXCLUDING THE MINES), WHERE ARE THE FOLLOWING PURCHASES MADE OR SERVICES OBTAINED (IF FROM OUTSIDE THE AREA, HOW DO THEY GET TO TUMBLER RIDGE)
- inventory
supplies
parts and materials
fuel
capital expenditures (vehicles, office furniture)
management
financial/legal advice
banking/insurance
other
- changing pattern over time?
11. IN THE LOCAL BUSINESSES (EXCLUDING THE MINES), HOW MANY PEOPLE FROM THE AREA WERE HIRED
- CAN YOU ESTIMATE HOW MANY WERE
- Natives/ from which community
women/ from which community
farmers/ from which area
new labour force entrants/ from which community
school-leavers/ from which community
previously unemployed/ from which community
12. ARE THERE ANY REPORTS WE SHOULD LOOK AT
13. IS THERE ONE OTHER KNOWLEDGEABLE PERSON WE SHOULD TALK TO IN THIS COMMUNITY

3. List of Interviewees

Mr. Mike Caisley, Mayor
Mrs. Michelle Coughlin, Economic Development Research Officer
Mr. Bob Miles, Clerk-Administrator
Ms. Cynthia Southard, Director of Community Services
Mrs. Ann Martin, Manager, Tumbler Ridge Chamber of Commerce
Mrs. Alvina VanDerMerwe, Welcome Wagon
Mrs. Nancy Perkins, Editor, Tumbler Ridge Record
Mrs. Sharon Bray, Librarian
Mr. Mark Baskin, Tumbler Ridge Building Supply
Mrs. Vi Chwartacki, Safeway Electric and Peacelander Realty
Mr. Steve Howard, Howard Construction
Mrs. Trudy Pinksen, Stylish Waves
Mr. Rob Willis, RJ Willin Investment Services
Mrs. Diane MacEachern, College Extension Programmer, Northern Lights College
Mr. John Olynyk, President Local #113, United Steelworkers of America
Mr. Gordon Giles, Manager, Royal Bank

C. MINING COMPANIES

1. Summary of Interview Results

Expenditure Category	% of Total Annual Average Expenditure	% Purchased Through Regional Businesses
Capital Equipment	33	65
Spare Parts	27	75
Fuel and Lubes	9	77
Explosives	5	100
Fabricating Services	3	60
Tires	3	100
Shipping	2	100
Miscellaneous	17	50
- sub-contractors		
- stationery		
- janitorial services		
- safety equipment		
- nuts and bolts		
- light vehicle maintenance		

	QCL	BOC
Source of Employees	see Table 5.1 in Chapter 5	most from other mining communities in BC
Residence of Employees		
Tumbler Ridge	1400	227
Chetwynd		99
Dawson Creek	100	15
Elsewhere in South Peace		0
Elsewhere in BC or Canada		4
Average Length of Employment	3-5 yrs.	5+ yrs.

2. Interview Schedule

In this research we are trying to identify benefits received and costs borne by communities in the South Peace area as a result of the North East Coal Project. In particular, we want to answer questions like:

how many people from the area work at the mine or in Tumbler Ridge, and do they live in Tumbler Ridge or another community, and

how much does the mine buy from local businesses, and what kinds of items or services are involved.

We would like to get detailed information to the extent possible, but will be pleased to receive any information you can give us.

1. NAME, POSITION, LENGTH OF RESIDENCE

2. WHERE DID THE EMPLOYEES AT YOUR MINE COME FROM

emphasize numbers

other communities in the area/which ones most important

other communities in B.C. interior

Lower Mainland or Vancouver Island

Western Canada

elsewhere

changing pattern over time?

3. DO MOST EMPLOYEES LIVE IN TUMBLER RIDGE

emphasize numbers

miners/ if not, where

tradespeople/ if not, where

management/ if not, where

clerical/ if not, where

other/ if not, where

changing pattern over time?

4. HOW LONG DO EMPLOYEES USUALLY STAY IN TUMBLER RIDGE

emphasize numbers

any relationship to demographic characteristics (single male argument)

changing pattern over time?

5. CAN YOU ESTIMATE THE PROPORTION OR NUMBER OF LOCAL PEOPLE HIRED WHO WERE

Natives/ from which community
 women/ from which community
 farmers/ from which community
 new labour force entrants/ from which community
 school-leavers/ from which community
 previously unemployed/ from which community

6. FOR THE MINE, WHERE ARE THE FOLLOWING PURCHASES MADE OR SERVICES OBTAINED

spare parts and materials
 fuel
 capital expenditures (new trucks, cats)
 special trade services (repairs)
 management
 financial/legal advice
 banking/insurance
 general supplies (food contractor, janitorial)
 other

if the purchases occur outside the region, how do they get to the mine
 (transport firm in Dawson Creek?)

changing pattern over time?

7. ARE THERE ANY REPORTS WE SHOULD LOOK AT

8. IS THERE ONE OTHER KNOWLEDGEABLE PERSON WE SHOULD TALK TO IN THIS COMMUNITY

3. List of Interviewees

Mrs. Jane Stock, Community Relations Officer, Quintette Coal Limited
 Mr. Neil MacPhedran, Director of Materials Management, Quintette Coal Limited
 Mrs. Dianna Marks, Senior Recruiter, Quintette Coal Limited
 Mr. Dennis Miller, Sales Representative, Quintette Housing
 Mr. Phil Martin, Superintendent Employee Relations, Bullmoose Operating Corporation
 Mr. Garry Davies, Chief Engineer, Bullmoose Operating Corporation
 Mr. Bill Cooling, Personnel Supervisor, Bullmoose Operating Corporation
 Mr. Wayne Fuel, Personnel Supervisor, Bullmoose Operating Corporation

APPENDIX 6A

EX POST BENEFIT-COST ANALYSIS DATA SOURCES AND ASSUMPTIONS

This appendix documents the data sources and assumptions employed in estimating the parameters of the *ex post* benefit-cost analysis of the NECP. In Section A, the available published estimates are reviewed, and the reasons for choosing a particular estimate are explained. In Section B, the parameter estimates for capital costs, operating costs, and revenues between 1980 and 1989 are summarized. Finally, a copy of the model used to calculate the net present value of the NECP is included. The complete data set is contained in the model.

Note: All figures in 1980\$ (inflated or deflated using GNP Implicit Price Index - GDP portion). Also, the data and the model discussed in this appendix address the financial viability of the NECP. Transforming this analysis to a benefit-cost analysis requires inclusion of social benefits and costs; these were examined in Chapter 6 but were not included in the modeling exercise.

A. DATA SOURCES AND ASSUMPTIONS

1. CAPITAL COSTS (are all total sum estimates not NPV)

Capital cost estimates for the Quintette and Bullmoose mines, the BCR and CNR, the port, and the provincial government are outlined below.

1a. Quintette Coal Limited:

Numerous estimates of capital costs are available:

Estimate	Source
1) \$751.008 Mn	NECP Study Group, April/83
2) \$740 Mn	Geoff Carter, Midland Doherty 1984
3) \$1.15 Bn	D. Barnett 1985
4) \$1.15 Bn	Horie, 1987
5) \$681 Mn	QCL Stage II Report, 1982
6) \$568 Mn	BC 1982A (based on PW 1981)
7) \$850.804 Mn	MacKnight 1989
8) \$14.111 Mn (Shikano Pit) spent \$5.759 in 1986, \$8.352 in 1987	Horie, 1987 & 1988

Of above estimates, #1, #2, #5, #6, #7 and #8 are in 1980\$, the others are in 'spent' or nominal dollars. The first estimate was originally reported in 'spent' dollars; it was converted to 1980\$ estimates by assuming a particular pattern of expenditures (taken from Carter, 1984) for the 'spent' dollar figure, deflating the dollars to their 1980 equivalents, and then summing the resulting annual, constant dollar, estimated expenditures.

All estimates include the capitalized value of interest charges during construction.

Most of these are pre-project estimates or were reported during construction (for later studies, are using data from reports issued during construction). Issue of cost overruns for QCL is important: Horie (1987) and (1988) mentions the 'snowballing' capital costs of QCL. Therefore, have assumed a 10% overrun of capital cost estimate, and split this extra spending equally over two years, 1984 and 1985. The Shikano Pit capital costs were spent in 1986 and 1987 as indicated above.

Based on Carter's estimate of the capital costs, (which was based on information from Denison), total capital cost was estimated at \$829.389 (\$1980C). Timing of expenditure was taken from Carter (1984), which showed the timing of Denison's commitments; cost overruns added in 1984 and 1985; Shikano expenditures in 1986 and 1987. The annual expenditures are as indicated in section B1.

1b. Bullmoose Operating Company:

Again, numerous estimates of capital costs are available.

Estimate	Source
1) \$217.397 Mn	NECP Study Group, April/83
2) \$327.160 Mn	G. Carter, 1983
3) \$275 Mn	Horie 1988
4) \$119 Mn	BC 1982A
5) \$203.438 Mn	D. MacKnight 1989

All estimates except #3 are in 1980\$. Re: estimate #1 a similar pattern to #1 in QCL data was followed to get a constant dollar estimate. All estimates include the capitalized value of interest charges during construction.

Horie (1988) does not mention any overruns in capital costs for BOC. Consequently have assumed no cost overruns, and have used the NECP Study Group estimate as the base case.

Timing of capital expenditures assumed to be approximately 5% in 1981, 47.5% in 1982 and 47.5% in 1983. This pattern was based on the PERT schedule for the NECP in BC 1982A.

1c. British Columbia Railway:

Two estimates of capital costs available:

1) \$505 Mn	Malkinson & Wakabayashi 1982
\$412 - Anzac	
57 - upgrading	
46 - rolling stock	
2) \$560 Mn in spent \$	NECP Study Group, April/83

First estimate is in 1980\$, second is in spent dollars.

Chose to use the first estimate. Allocated the timing of expenditures based on the PERT schedule in BC 1982A:

Anzac - 20% in 1981, 50% in 1982, 30% in 1983

Upgrading - 33% in 1981, 1982 and 1983

Rolling Stock - all purchased in 1983

1d. Canadian National Railways

Two estimates available:

- 1) \$193 Mn Malkinson & Wakabayashi 1982
 Upgrading - $\$192/2 = 96$ (half to grain, half to coal)
 Rolling Stock - \$97
- 2) \$270 Mn NECP Study Group, April/83
 (again, is a total estimate for upgrading)

Only first estimate is in 1980\$; chose to use it. Timing also allocated according to PERT schedule in BC 1982A: for upgrading work, 30% in 1981, 20% in 1982, 20% in 1983, 15% in 1984, 15% in 1985; for rolling stock, all purchased in 1983.

1e. Port:

Three estimates available:

- 1) \$280 Mn NECP Study Group, April/83
- 2) \$230 Mn G. Carter, 1983
- 3) \$197 Mn Price Waterhouse 1981

All estimates are in spent dollars. Chose to use the NECP Study Group estimate. Allocated the expenditures using the PERT schedule in BC 1982A. First took off \$8 Mn, which was the estimated cost of the road access to the area; this cost was being picked up by BC and Canada, split 50/50. Remainder split 60% in 1982, 40% in 1983. Resulting expenditure estimates deflated to 1980\$ and summed for capital cost estimate in 1980\$ of \$221.434 Mn.

1f. BC Government:

Capital costs incurred for BC Hydro service to townsite and mines, new highway to Ridley Island and to townsite, and to carry the financing for the townsite for 7 years. In addition, as per BC 1982A, the Anzac branchline capital costs were transferred to the BC Government account. For the costs of the latter see above.

i) BC Hydro Costs: 3 estimates available

- 1) \$35 Mn NECP Study Group, April/83
- 2) \$21 Mn G. Carter, 1983
- 3) \$36 Mn Price Waterhouse, 1981

All are in spent dollars. According to PERT schedule, all work done in 1981 and 1982; assumed approximately 40% done in 1981, 60% in 1982. Deflated spent dollars to 1980\$ estimate of \$30 Mn (14 Mn in 1981, 16 Mn in 1982).

ii) Ministry of Highways Costs:

In addition to the cost of roadwork to Ridley Island:

- | | |
|-------------------------------------|----------------------------|
| 1) \$90 Mn + \$13.45 Mn for | NECP Study Group, April/83 |
| upgrading railway crossings in 1984 | |
| 2) \$54 Mn | Price Waterhouse 1981 |

Only #2 is in 1980\$C and it was a pre-project estimate. Chose to use #1, and followed similar procedure to Hydro to estimate 1980\$ expenditure of \$73.728; \$12.177 in 1981, \$29.88 in 1982, \$21.357 in 1983, \$10.314 in 1984. Based on expenditure patten of 15% in 1981, 40% in 1982, 30% in 1983, 15% in 1984, applied to nominal dollar expenditure, then deflated to 1980\$ estimates.

iii) Municipal Costs:

Assumed \$5 Mn in 1980\$, spread over 7 years evenly (\$0.71 Mn per year); based on Price Waterhouse 1981 estimate.

1g. Canadian Government:

In addition to the roadwork to Ridley Island Terminal (\$4 Mn in 1981) and the federal share of highway upgradings for railway crossings (\$13.45 Mn in 1984), assumed spending on navigation aids according to Price Waterhouse 1981 (\$2 Mn in 1981, \$4 Mn in 1982)

2. OPERATING COSTS

2a. Mines

i) Onsite operating costs: 3 estimates for QCL

- | | |
|---------------|--------------|
| 1) \$54.55/MT | Barnett 1985 |
| 2) \$33.11/MT | Carter 1983 |
| 3) \$29.59/MT | IEA 1988 |

#2 has royalty charge removed, but #1 includes royalty, CAPEX and return to equity. Chose to use #2.

Only 2 estimates for BOC

- | | |
|---------------|--------------|
| 1) \$39.28/MT | Barnett 1985 |
| 2) \$28.75/MT | Carter 1983 |

Similar comments to QCL, chose to use #2.

ii) Ongoing Capital Expenditure Costs:

2 estimates available:

- | | |
|---|---|
| 1) \$4.46/MT | MacKnight 1989
Based on average for Canadian mines
between 1985 and 1988 when no new coal mines
were developed in Canada |
| 2) \$3.09/MT for QCL
\$2.81/MT for BOC | Carter 1983 |

Used first estimate: assumed constant over time period.

iii) Royalty: 3.5% based on current policy in BC

iv) Rail Freight:

3 estimates:

- | | |
|---|----------------|
| 1) \$14.20/MT QCL in 1986
\$14.12/MT BOC in 1986 | Horie 1987,320 |
| 2) \$17.46/MT QCL
\$16.37/MT BOC | Barnett 1985 |
| 3) \$16.60/MT QCL
\$16.50/MT BOC | Carter 1983 |

Chose to use #1. Note there was a \$2.00/MT (in nominal dollars! - see BC 1982A, 92) discount between 1984 and 1989; in 1986 equal to \$1.42/MT - thus freight charge without discount would have been \$15.62 for QCL, \$15.54 for BOC. Very close to what BC (1982a, 92) said the charges would be: \$15.86 for QCL, \$15.76 for BOC. Assumed schedule for freight charges was:

	QCL	BOC
1983	\$15.86	\$15.76
1984	14.33	14.23
1985	14.38	14.28
1986	14.44	14.34
1987	14.49	14.39
1988	14.52	14.42
1989	15.86	15.76

v) Anzac Surcharge:

Charge for QCL is \$3.00/MT in nominal terms, \$2.50/MT for BOC in nominal terms. No escalation until 1989, after that increases supposedly tied to coal prices. No variation assumed in this analysis; assumed to be constant from 1989 onwards. Assumed schedule

of charges was:

	QCL	BOC
1983	\$2.37	\$1.98
1984	2.29	1.91
1985	2.22	1.85
1986	2.13	1.78
1987	2.06	1.72
1988	2.00	1.67
B 1989	2.00	1.67

Did not change the charge after 1989 because under anything but the status quo scenario, it would drop enormously. I have assumed the BC Government would not have included a decline in this charge commensurate with real coal price declines; if they did, the BC Government's position will be even worse than indicated by this analysis.

vi) Port Charge:

According to Horie (1987), Carter (1983), and BC (1982A), the charge was \$3.00/MT in 1980\$ from 1983 to 1988, and BC (1982A) reported that the coal companies and the port had negotiated an increase of \$0.30/MT (1980\$) for 1989.

vii) Lease Payment = \$6.68/ha (MacKnight 1989)

2b. Railways

Two estimates on the operating cost associated with the entire length of the haul.

- | | |
|------------------------------------|-----------------------|
| 1) \$8.00/MT | Price Waterhouse 1981 |
| 2) \$6.69/MT | Patching et al. 1980 |
| 3) \$5.39/MT CNR;
\$3.04/MT BCR | BC 1982A |

While PW 1981 split the cost, 60% to CNR, 40% to BCR; it appears that the CNR has 3 times the distance of the BCR, so I decided to split the costs 75% to CNR, 25% to BCR.

Chose to use #1, because second estimate is an average for BC and Alberta, and the operating costs in the north are probably slightly higher.

2c. Port:

No good estimates on operating costs: chose to use Price Waterhouse 1981 estimate of \$1.00/MT (1980\$). This is ok in the context of this project and this analysis because the port is 90% owned by the National Harbours Board, a Crown Corporation, so corporate income taxes arising from greater profit levels would not be substantial anyway.

3. REVENUES

3a. Mines

Prices obtained from Horie, 1987 and 1988 editions. Assumed the BOC price for 1983 was equal to QCL's 1983 price (could not find a BOC price for 1983).

Volumes for 1983 to 1987 taken from the Horie, 1987 and 1988.

3b. Railways

Assumed the freight charge from QCL is split approximately 70% to CNR, 30% to BCR (actually 69.23% and 30.77%); for BOC, the assumed split was 69.67% to CNR, 30.33% to BCR. This is based on CNR receiving a flat rate from both mines of \$10.98/MT (1980\$); BCR gets the remainder. The rail discount was split in the same fashion. The actual schedule of these charges is above in section B3. Railway Revenues.

The Anzac surcharge is placed within the BC Government revenue account, as the capital cost for the branch line is also there.

3c. Port:

Revenues = 100% of charges

3d. BC Government

Anzac surcharge, royalty, lease payment, plus any corporate income and mining taxes (both assumed to be nil).

3e. Canada

Only revenues are from corporate income taxes, which are assumed to be nil.

B. SUMMARY OF DATA USED IN BENEFIT-COST MODEL

1. CAPITAL COSTS

	1981	1982	1983	1984	1985	1986	1987
QCL	75.176	202.023	444.905	56.115	37.058	5.759	8.352
BOC	10.870	103.264	103.264	0	0	0	0
BCR	19.0	19.0	65.0	0	0	0	0
CNR	28.8	19.2	116.2	14.4	14.4	0	0
PORT	0	135.424	86.010	0	0	0	0
BC TOT	110.90	254.59	145.67	24.474	0.71	0.71	0.71
BC	28.495	48.590	22.067	24.474	0.71	0.71	0.71
ANZAC	82.4	206.0	123.6	0	0	0	0
CANADA	6.00	4	0	13.45	0	0	0

2. OPERATING COSTS

Mines

On-Site: QCL \$31.55/MT
BOC \$28.75/MT

Capex: QCL \$4.46/MT
BOC \$4.46/MT

Royalty: 3.5% of minehead revenue
MR = (Total Revenue-Transport Charges)

Freight: (\$/MT)	QCL		1983		1984		1985		1986		1987		1988		1989	
CNR	10.98	9.92	9.95	10.00	10.03	10.05	10.98									
BCR	4.88	4.41	4.43	4.44	4.46	4.47	4.88									
TOTAL	15.86	14.33	14.38	14.44	14.49	14.52	15.86									

	BOC		1983		1984		1985		1986		1987		1988		1989	
CNR	10.98	9.92	9.95	10.00	10.03	10.05	10.98									
BCR	4.78	4.31	4.33	4.34	4.36	4.37	4.78									
TOTAL	15.76	14.23	14.28	14.34	14.39	14.42	15.76									

Anzac: (\$/MT)	QCL		1983		1984		1985		1986		1987		1988		1989	
	2.37	2.29	2.22	2.13	2.06	2.00	2.00									

	BOC		1983		1984		1985		1986		1987		1988		1989	
	1.98	1.91	1.85	1.78	1.72	1.67	1.67									

Port: \$3.00/MT (1983 - 1988)
\$3.30/MT (1989 - 2003)

Corporate Income Tax, Mining Tax:

Assumed no payments during life of project

Lease Payments: \$6.68/ha. (included in on-site cost estimate)

QCL: 44,736 ha (Horie, 1987)

BOC: 6,064 ha (Horie, 1987)

Railways

BCR \$2.00/MT
CNR \$6.00/MT

Port

\$1.00/MT

3. REVENUES

3a Mines Price (\$/MT) x Volume (MMT)

QCL

	1983	1984	1985	1986	1987	1988	1989
Volume	0.336	3.376	4.907	4.75	4.75	4.75	4.75
Price	74.39	74.29	68.75	67.71	66.33	64.35	60.34

(declining to 54.53 in 1990, and 47.79 in 1991; for contract and competitive price scenarios after 1991, see Chapter 6)

BOC

	1983	1984	1985	1986	1987	1988	1989
Volume	0.406	2.010	1.896	1.615	1.615	1.615	1.615
Price	74.39	74.11	68.77	67.76	62.95	62.95	62.95

(declining to 54.43 in 1990, and 47.79 in 1991; for contract and competitive price scenarios after 1991, see Chapter 6)

BALMER (for estimate of JSI overpayments)

Price	55.24	52.79	51.20	48.32	40.02	40.26	40.50
-------	-------	-------	-------	-------	-------	-------	-------

(and increasing at 0.6%/yr. thereafter)

3b Railways Freight Charge (\$/MT)

	1983	1984	1985	1986	1987	1988	1989
BCR-QCL	4.88	4.41	4.43	4.44	4.46	4.47	4.88
BCR-BOC	4.78	4.31	4.33	4.34	4.36	4.37	4.78
CNR-QCL	10.98	9.92	9.95	10.00	10.03	10.05	10.98
CNR-BOC	10.98	9.92	9.95	10.00	10.03	10.05	10.98

3c Port Loading Charge (\$/MT)

	1983	1984	1985	1986	1987	1988	1989
	3.00	3.00	3.00	3.00	3.00	3.00	3.30

3d BC Government Taxes, Royalties, Lease Payments, Anzac Surcharge

Assume no taxes paid during time period

Lease payments: \$6.68/ha

QCL 44,736 ha

BOC 6,064 ha

Royalties are 3.5% of minehead revenue,
where M.R. = Tot Rev - Transport Charges

Anzac Surcharge (\$/MT)

	1983	1984	1985	1986	1987	1988	1989
QCL	2.37	2.29	2.22	2.13	2.06	2.00	2.00
BOC	1.98	1.91	1.85	1.78	1.72	1.67	1.67

3e Canada Taxes

Assume no taxes paid during time period

Note: there may be some bias created by the approach used to estimate annual capital costs. For BOC, BCR and CNR estimates, the total capital cost estimates in 1980\$ were annualized using the PERT schedule in BC 1982A. For the PORT, BCHYDRO and HIGHWAYS the total capital cost estimates in nominal dollars were annualized according to the PERT schedule and then deflated to 1980\$. The former technique may make some of the capital costs occur too late (which makes the project look better than it is), and the latter may make some of the capital costs occur too early (but they are relatively small in relation to the other components and so will not affect overall result much).

BENEFIT COST MODEL: NORTH EAST COAL PROJECT

N. Knight, July 1989 (Updated January 1990, and again Sept 30/90)

Model has seven components: Data Table, Summary Table, Mining Sector, Transportation Sector, B.C. Government Sector, Canada Government Sector, and Adjustments to Standard Evaluation Sector.

Macros for various scenarios are defined to the right, in AA area

Note: Model only examines metallurgical coal production

For Price:	MINES	
1: Status Quo		3
2: Competitive	Op. Cost	1
3: Contract	Capex	1
4: Pre-Project	RAILWAYS	
All Others:	BCR Op.Co	1
1: Status Quo	CNR Op.Co	1
2: -10%	PORT	
3: -10%	Op. Cost	1

SUMMARY TABLE OF RESULTS (Millions of 1980\$C)

	NPV of Gross Bt	NPV of Gross Ct	NPV	IRR
Quintette Coal Ltd.	\$1,665	\$2,337	(\$672)	-135.1%
Hullmoose Oper. Co.	\$638	\$777	(\$139)	-232.0%
Mining Sector Total	\$2,303	\$3,113	(\$811)	-172.5%
BC Railway	\$189	\$163	\$26	13.9%
CN Railway	\$427	\$391	\$36	13.1%
Ridley Island Port	\$128	\$217	(\$89)	2.1%
Transport Total	\$744	\$771	(\$27)	9.1%
BC Govt. Sector	\$135	\$439	(\$304)	-3.1%
Canada Govt. Sector	\$0	\$18	(\$18)	N/A
Adjustments Sector				
TOTAL			(\$1,160)	-64.9%

DATA TABLE

Run description: contract price; all other costs at status quo til 2003;

Discount Rate: 0.10

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Volume shipped: (MMT)																							
QCL	0.00	0.00	0.34	3.38	4.91	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75
BOC	0.00	0.00	0.41	2.01	1.90	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62
Coal Price (per MT):																							
QCL	\$0.00	\$0.00	\$74.39	\$74.29	\$68.75	\$67.61	\$71.24	\$71.24	\$71.24	\$71.24	\$71.24	\$71.24	\$71.24	\$71.24	\$71.24	\$71.24	\$71.24	\$71.24	\$71.24	\$71.24	\$71.24	\$71.24	\$71.24
BOC	\$0.00	\$0.00	\$74.39	\$74.11	\$68.77	\$67.76	\$62.95	\$62.95	\$62.95	\$62.95	\$62.95	\$62.95	\$62.95	\$62.95	\$62.95	\$62.95	\$62.95	\$62.95	\$62.95	\$62.95	\$62.95	\$62.95	\$62.95
Balmer	\$0.00	\$0.00	\$55.24	\$52.79	\$51.20	\$48.32	\$40.02	\$40.02	\$40.02	\$40.02	\$40.02	\$40.02	\$40.02	\$40.02	\$40.02	\$40.02	\$40.02	\$40.02	\$40.02	\$40.02	\$40.02	\$40.02	\$40.02
QCL Competitive Price	\$0.00	\$0.00	\$74.39	\$74.29	\$68.75	\$67.61	\$66.33	\$64.35	\$60.34	\$54.53	\$47.79	\$41.24	\$41.48	\$41.73	\$41.98	\$42.23	\$42.49	\$42.74	\$43.00	\$43.26	\$43.52	\$43.78	\$44.04
BOC Competitive Price	\$0.00	\$0.00	\$74.39	\$74.11	\$68.77	\$67.76	\$62.95	\$62.95	\$60.34	\$54.53	\$47.79	\$41.24	\$41.48	\$41.73	\$41.98	\$42.23	\$42.49	\$42.74	\$43.00	\$43.26	\$43.52	\$43.78	\$44.04
QCL Contract Price	\$0.00	\$0.00	\$74.39	\$74.29	\$68.75	\$67.61	\$66.33	\$64.35	\$60.34	\$54.53	\$47.79	\$46.45	\$45.02	\$43.48	\$42.75	\$42.23	\$42.49	\$42.74	\$43.00	\$43.26	\$43.52	\$43.78	\$44.04
BOC Contract Price	\$0.00	\$0.00	\$74.39	\$74.11	\$68.77	\$67.76	\$62.95	\$62.95	\$60.34	\$54.53	\$47.79	\$46.45	\$45.02	\$43.48	\$42.75	\$42.23	\$42.49	\$42.74	\$43.00	\$43.26	\$43.52	\$43.78	\$44.04
QCL (pre-project)	\$0.00	\$0.00	\$66.80	\$66.80	\$65.38	\$64.19	\$66.11	\$68.09	\$70.14	\$70.56	\$70.98	\$71.41	\$71.84	\$72.27	\$72.70	\$73.14	\$73.58	\$74.02	\$74.46	\$74.91	\$75.36	\$75.81	\$76.26
BOC (pre-project)	\$0.00	\$0.00	\$67.83	\$67.83	\$66.54	\$65.44	\$64.54	\$63.81	\$70.14	\$70.56	\$70.98	\$71.41	\$71.84	\$72.27	\$72.70	\$73.14	\$73.58	\$74.02	\$74.46	\$74.91	\$75.36	\$75.81	\$76.26
On-site Operating Costs (\$/MT):																							
QCL	\$0.00	\$0.00	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55
Plus 10%	\$0.00	\$0.00	\$31.55	\$31.70	\$31.85	\$32.01	\$32.16	\$32.32	\$32.47	\$32.63	\$32.78	\$32.94	\$33.10	\$33.26	\$33.42	\$33.58	\$33.74	\$33.90	\$34.06	\$34.23	\$34.39	\$34.56	\$34.72
Minus 10%	\$0.00	\$0.00	\$31.55	\$31.38	\$31.22	\$31.06	\$30.89	\$30.73	\$30.57	\$30.41	\$30.25	\$30.09	\$29.93	\$29.78	\$29.62	\$29.46	\$29.31	\$29.16	\$29.00	\$28.85	\$28.70	\$28.55	\$28.40
BOC	\$0.00	\$0.00	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75
Plus 10%	\$0.00	\$0.00	\$28.75	\$28.89	\$29.03	\$29.17	\$29.31	\$29.45	\$29.59	\$29.73	\$29.87	\$30.02	\$30.16	\$30.31	\$30.45	\$30.60	\$30.74	\$30.89	\$31.04	\$31.19	\$31.34	\$31.49	\$31.63
Minus 10%	\$0.00	\$0.00	\$28.75	\$28.60	\$28.45	\$28.30	\$28.15	\$28.00	\$27.86	\$27.71	\$27.56	\$27.42	\$27.28	\$27.13	\$26.99	\$26.85	\$26.71	\$26.57	\$26.43	\$26.29	\$26.15	\$26.01	\$25.87
Ongoing Capital Expenditure (\$/MT)																							
QCL and BOC	\$0.00	\$0.00	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46
Plus 10%	\$0.00	\$0.00	\$4.50	\$4.52	\$4.54	\$4.57	\$4.59	\$4.61	\$4.63	\$4.65	\$4.68	\$4.70	\$4.72	\$4.74	\$4.77	\$4.79	\$4.81	\$4.84	\$4.86	\$4.88	\$4.91	\$4.93	\$4.95
Minus 10%	\$0.00	\$0.00	\$4.50	\$4.48	\$4.45	\$4.43	\$4.41	\$4.38	\$4.36	\$4.34	\$4.31	\$4.29	\$4.27	\$4.25	\$4.23	\$4.20	\$4.18	\$4.16	\$4.14	\$4.12	\$4.09	\$4.07	\$4.05
Railway Charge/MT (Freight)																							
QCL - CNR	\$0.00	\$0.00	\$10.98	\$9.92	\$9.95	\$10.00	\$10.03	\$10.05	\$10.98	\$10.98	\$10.98	\$10.98	\$10.98	\$10.98	\$10.98	\$10.98	\$10.98	\$10.98	\$10.98	\$10.98	\$10.98	\$10.98	\$10.98
QCL - BCR	\$0.00	\$0.00	\$4.88	\$4.41	\$4.43	\$4.44	\$4.46	\$4.47	\$4.88	\$4.88	\$4.88	\$4.88	\$4.88	\$4.88	\$4.88	\$4.88	\$4.88	\$4.88	\$4.88	\$4.88	\$4.88	\$4.88	\$4.88
BOC - CNR	\$0.00	\$0.00	\$10.98	\$9.92	\$9.95	\$10.00	\$10.03	\$10.05	\$10.98	\$10.98	\$10.98	\$10.98	\$10.98	\$10.98	\$10.98	\$10.98	\$10.98	\$10.98	\$10.98	\$10.98	\$10.98	\$10.98	\$10.98
BOC - BCR	\$0.00	\$0.00	\$4.78	\$4.31	\$4.33	\$4.34	\$4.36	\$4.37	\$4.78	\$4.78	\$4.78	\$4.78	\$4.78	\$4.78	\$4.78	\$4.78	\$4.78	\$4.78	\$4.78	\$4.78	\$4.78	\$4.78	\$4.78
Anzac Surcharge/MT																							
QCL	\$0.00	\$0.00	\$2.37	\$2.29	\$2.22	\$2.13	\$2.06	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00
BOC	\$0.00	\$0.00	\$1.98	\$1.91	\$1.85	\$1.78	\$1.72	\$1.67	\$1.67	\$1.67	\$1.67	\$1.67	\$1.67	\$1.67	\$1.67	\$1.67	\$1.67	\$1.67	\$1.67	\$1.67	\$1.67	\$1.67	\$1.67
Port Charge (AFT)																							
QCL	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00
BOC	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00
Mine Capital Costs																							
QCL	\$75.18	\$202.02	\$444.91	\$56.12	\$37.06	\$5.76	\$8.35	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
BOC	\$10.87	\$103.26	\$103.26	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Railway Capital Costs																							
BCR	\$19.00	\$19.00	\$63.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
CNR	\$28.80	\$19.20	\$116.20	\$14.40	\$14.40	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00

MINING SECTOR

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003		
Quintette																									
Sales of Met. Coal (MMT)	0.00	0.00	0.34	3.38	4.91	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	1.25	
Price Received \$/MT	\$0.00	\$0.00	\$74.39	\$74.29	\$68.75	\$67.61	\$66.33	\$64.35	\$60.34	\$54.53	\$47.79	\$46.45	\$45.02	\$43.48	\$42.75	\$42.23	\$42.49	\$42.74	\$43.00	\$43.26	\$43.52	\$43.78	\$44.04		
Revenues (\$ Millions)	\$0.00	\$0.00	\$25.00	\$250.80	\$337.36	\$321.15	\$315.07	\$305.66	\$286.62	\$259.02	\$227.00	\$220.64	\$213.85	\$206.53	\$203.06	\$200.59	\$201.83	\$203.02	\$204.25	\$205.49	\$206.72	\$207.96	\$209.20	\$210.44	
Costs (\$ Millions)																									
Capital Constr	\$75.18	\$202.02	\$444.91	\$56.12	\$37.06	\$5.76	\$8.35	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	
Ongoing CapExp/MT	\$0.00	\$0.00	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	
Total Ongoing CapExp	\$0.00	\$0.00	\$1.50	\$15.06	\$21.89	\$21.19	\$21.19	\$21.19	\$21.19	\$21.19	\$21.19	\$21.19	\$21.19	\$21.19	\$21.19	\$21.19	\$21.19	\$21.19	\$21.19	\$21.19	\$21.19	\$21.19	\$21.19	\$21.19	\$5.58
Operating Costs/MT	\$0.00	\$0.00	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55	\$31.55
Total Operating Costs	\$0.00	\$0.00	\$10.60	\$106.51	\$154.82	\$149.86	\$149.86	\$149.86	\$149.86	\$149.86	\$149.86	\$149.86	\$149.86	\$149.86	\$149.86	\$149.86	\$149.86	\$149.86	\$149.86	\$149.86	\$149.86	\$149.86	\$149.86	\$149.86	\$39.44
Transportation Charges	\$0.00	\$0.00	\$7.13	\$66.24	\$96.18	\$92.96	\$92.86	\$92.72	\$100.51	\$100.51	\$100.51	\$100.51	\$100.51	\$100.51	\$100.51	\$100.51	\$100.51	\$100.51	\$100.51	\$100.51	\$100.51	\$100.51	\$100.51	\$100.51	\$26.45
Coal Royalty	\$0.00	\$0.00	\$0.63	\$6.46	\$8.44	\$7.99	\$7.78	\$7.45	\$6.51	\$5.55	\$4.43	\$4.20	\$3.97	\$3.71	\$3.59	\$3.50	\$3.55	\$3.59	\$3.63	\$3.67	\$3.72	\$3.76	\$3.76	\$3.76	\$1.00
Corporate Income Taxes	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Total	\$75.18	\$202.02	\$444.76	\$250.38	\$318.38	\$277.75	\$280.04	\$271.22	\$278.07	\$277.11	\$275.98	\$275.76	\$275.52	\$275.27	\$275.15	\$275.06	\$275.10	\$275.15	\$275.19	\$275.23	\$275.27	\$275.32	\$275.32	\$275.32	
QCL Net Revenues	(\$75.18)	(\$202.02)	(\$439.77)	\$0.42	\$18.98	\$43.40	\$15.03	\$34.44	\$8.54	(\$18.09)	(\$48.98)	(\$55.12)	(\$61.68)	(\$68.74)	(\$72.08)	(\$74.47)	(\$73.28)	(\$72.13)	(\$70.94)	(\$69.75)	(\$68.55)	(\$67.36)	(\$17.41)		
Net Present Value	(\$672)																								
IRR	-135.1%																								
Bullmoose																									
Sales of Met. Coal (MMT)	0.00	0.00	0.41	2.01	1.90	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	
Price Received \$/MT	\$0.00	\$0.00	\$74.39	\$74.11	\$68.77	\$67.76	\$62.95	\$62.95	\$60.34	\$54.53	\$47.79	\$46.45	\$45.02	\$43.48	\$42.75	\$42.23	\$42.49	\$42.74	\$43.00	\$43.26	\$43.52	\$43.78	\$44.04		
Revenues (\$ Millions)	\$0.00	\$0.00	\$30.20	\$148.96	\$130.39	\$109.43	\$101.66	\$101.66	\$97.45	\$88.07	\$77.18	\$75.02	\$72.71	\$70.22	\$69.04	\$68.20	\$68.62	\$69.03	\$69.45	\$69.86	\$70.28	\$70.70	\$71.12		
Costs (\$ Millions)																									
Capital Constr	\$10.87	\$103.26	\$103.26	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	
Ongoing CapExp/MT	\$0.00	\$0.00	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	\$4.46	
Total Ongoing CapExp	\$0.00	\$0.00	\$1.81	\$8.96	\$8.46	\$7.20	\$7.20	\$7.20	\$7.20	\$7.20	\$7.20	\$7.20	\$7.20	\$7.20	\$7.20	\$7.20	\$7.20	\$7.20	\$7.20	\$7.20	\$7.20	\$7.20	\$7.20	\$7.20	\$7.20
Operating Costs/MT	\$0.00	\$0.00	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75	\$28.75
Total Operating Costs	\$0.00	\$0.00	\$11.67	\$57.79	\$54.51	\$46.43	\$46.43	\$46.43	\$46.43	\$46.43	\$46.43	\$46.43	\$46.43	\$46.43	\$46.43	\$46.43	\$46.43	\$46.43	\$46.43	\$46.43	\$46.43	\$46.43	\$46.43	\$46.43	\$46.43
Transportation Charges	\$0.00	\$0.00	\$8.42	\$38.47	\$36.27	\$30.88	\$30.86	\$30.83	\$33.48	\$33.48	\$33.48	\$33.48	\$33.48	\$33.48	\$33.48	\$33.48	\$33.48	\$33.48	\$33.48	\$33.48	\$33.48	\$33.48	\$33.48	\$33.48	\$33.48
Coal Royalty	\$0.00	\$0.00	\$0.76	\$3.87	\$3.29	\$2.75	\$2.48	\$2.48	\$2.24	\$1.91	\$1.53	\$1.45	\$1.37	\$1.29	\$1.24	\$1.22	\$1.23	\$1.24	\$1.26	\$1.27	\$1.29	\$1.30	\$1.32	\$1.32	
Corporate Income Taxes	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	
Total	\$10.87	\$103.26	\$125.93	\$109.09	\$102.53	\$87.26	\$86.97	\$86.94	\$89.15	\$89.02	\$88.64	\$88.57	\$88.49	\$88.40	\$88.36	\$88.33	\$88.34	\$88.36	\$88.37	\$88.39	\$88.40	\$88.42	\$88.43		
Bullmoose Net Revenues	(\$10.87)	(\$103.26)	(\$95.73)	\$39.87	\$27.86	\$22.17	\$14.69	\$14.72	\$8.10	(\$0.96)	(\$1.46)	(\$13.55)	(\$15.78)	(\$18.18)	(\$19.32)	(\$20.13)	(\$19.72)	(\$19.33)	(\$18.93)	(\$18.52)	(\$18.12)	(\$17.71)	(\$17.31)		
Net Present Value	(\$139.11)																								
IRR	-232.0%																								
MINING SECTOR NET REV	(\$86.05)	(\$305.29)	(\$535.50)	\$40.29	\$46.84	\$65.57	\$49.72	\$49.16	\$16.64	(\$19.05)	(\$60.44)	(\$68.67)	(\$77.46)	(\$86.92)	(\$91.40)	(\$94.59)	(\$93.00)	(\$91.46)	(\$89.87)	(\$88.27)	(\$86.67)	(\$85.07)	(\$34.72)		
Net Present Value	(\$811)																								
IRR	-172.5%																								

TRANSPORTATION SECTOR

British Columbia Railway

Revenue(\$Millions)																							
Quintette Shipments	\$0.00	\$0.00	\$1.64	\$14.89	\$21.74	\$21.09	\$21.19	\$21.23	\$23.18	\$23.18	\$23.18	\$23.18	\$23.18	\$23.18	\$23.18	\$23.18	\$23.18	\$23.18	\$23.18	\$23.18	\$23.18	\$23.18	\$6.10
Bullmoose Shipments	\$0.00	\$0.00	\$1.94	\$8.66	\$8.21	\$7.01	\$7.04	\$7.06	\$7.72	\$7.72	\$7.72	\$7.72	\$7.72	\$7.72	\$7.72	\$7.72	\$7.72	\$7.72	\$7.72	\$7.72	\$7.72	\$7.72	\$7.72
Total Revenue	\$0.00	\$0.00	\$3.58	\$23.55	\$29.95	\$28.10	\$28.23	\$28.29	\$30.90	\$30.90	\$30.90	\$30.90	\$30.90	\$30.90	\$30.90	\$30.90	\$30.90	\$30.90	\$30.90	\$30.90	\$30.90	\$30.90	\$13.82
Costs(\$Millions)																							
Capital	\$19.00	\$19.00	\$65.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Operating Costs/MT	\$0.00	\$0.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00
Total Operating Costs	\$0.00	\$0.00	\$1.48	\$10.77	\$13.61	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$5.73
Total	\$19.00	\$19.00	\$66.48	\$10.77	\$13.61	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$5.73
Net BCR Revenue	(\$19.00)	(\$19.00)	(\$62.90)	\$12.78	\$16.34	\$15.37	\$15.50	\$15.56	\$18.17	\$18.17	\$18.17	\$18.17	\$18.17	\$18.17	\$18.17	\$18.17	\$18.17	\$18.17	\$18.17	\$18.17	\$18.17	\$18.17	\$8.09
Net Present Value	\$25.87																						
IRR	13.9%																						

Canadian National Railway

Revenue(\$Millions)																							
Quintette Shipments	\$0.00	\$0.00	\$3.69	\$33.49	\$48.82	\$47.50	\$47.64	\$47.74	\$52.16	\$52.16	\$52.16	\$52.16	\$52.16	\$52.16	\$52.16	\$52.16	\$52.16	\$52.16	\$52.16	\$52.16	\$52.16	\$52.16	\$13.73
Bullmoose Shipments	\$0.00	\$0.00	\$4.46	\$19.94	\$18.87	\$16.15	\$16.20	\$16.23	\$17.73	\$17.73	\$17.73	\$17.73	\$17.73	\$17.73	\$17.73	\$17.73	\$17.73	\$17.73	\$17.73	\$17.73	\$17.73	\$17.73	\$17.73
Total Revenue	\$0.00	\$0.00	\$8.15	\$53.43	\$67.69	\$63.65	\$63.84	\$63.97	\$69.89	\$69.89	\$69.89	\$69.89	\$69.89	\$69.89	\$69.89	\$69.89	\$69.89	\$69.89	\$69.89	\$69.89	\$69.89	\$69.89	\$31.46
Costs(\$Millions)																							
Capital	\$28.80	\$19.20	\$116.20	\$14.40	\$14.40	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Operating Costs/MT	\$0.00	\$0.00	\$6.00	\$6.00	\$6.00	\$6.00	\$6.00	\$6.00	\$6.00	\$6.00	\$6.00	\$6.00	\$6.00	\$6.00	\$6.00	\$6.00	\$6.00	\$6.00	\$6.00	\$6.00	\$6.00	\$6.00	\$6.00
Total Operating Costs	\$0.00	\$0.00	\$4.45	\$32.32	\$40.82	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$17.19
Total	\$28.80	\$19.20	\$120.65	\$46.72	\$55.22	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$17.19
Net CNR Revenue	(\$28.80)	(\$19.20)	(\$112.50)	\$6.71	\$12.47	\$25.46	\$25.65	\$25.78	\$31.70	\$31.70	\$31.70	\$31.70	\$31.70	\$31.70	\$31.70	\$31.70	\$31.70	\$31.70	\$31.70	\$31.70	\$31.70	\$31.70	\$14.27
Net Present Value	\$35.84																						
IRR	13.1%																						

Ridley Island Terminal

Revenue(\$Millions)																							
Quintette Shipments	\$0.00	\$0.00	\$1.01	\$10.13	\$14.72	\$14.25	\$14.25	\$14.25	\$15.68	\$15.68	\$15.68	\$15.68	\$15.68	\$15.68	\$15.68	\$15.68	\$15.68	\$15.68	\$15.68	\$15.68	\$15.68	\$15.68	\$4.13
Bullmoose Shipments	\$0.00	\$0.00	\$1.22	\$6.03	\$5.69	\$4.85	\$4.85	\$4.85	\$5.33	\$5.33	\$5.33	\$5.33	\$5.33	\$5.33	\$5.33	\$5.33	\$5.33	\$5.33	\$5.33	\$5.33	\$5.33	\$5.33	\$5.33
Total Revenue	\$0.00	\$0.00	\$2.23	\$16.16	\$20.41	\$19.10	\$19.10	\$19.10	\$21.00	\$21.00	\$21.00	\$21.00	\$21.00	\$21.00	\$21.00	\$21.00	\$21.00	\$21.00	\$21.00	\$21.00	\$21.00	\$21.00	\$9.45
Costs(\$Millions)																							
Capital	\$0.00	\$135.42	\$86.01	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Operating Costs/MT	\$0.00	\$0.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00
Total Operating Costs	\$0.00	\$0.00	\$0.74	\$5.39	\$6.80	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$2.87
Total	\$0.00	\$135.42	\$86.75	\$5.39	\$6.80	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$2.87
Net Port Revenue	\$0.00	(\$135.42)	(\$84.53)	\$10.77	\$13.61	\$12.73	\$12.73	\$12.73	\$14.64	\$14.64	\$14.64	\$14.64	\$14.64	\$14.64	\$14.64	\$14.64	\$14.64	\$14.64	\$14.64	\$14.64	\$14.64	\$14.64	\$6.59
Net Present Value	(\$88.92)																						
IRR	2.1%																						

TOTAL NET REVENUES - TRANSPORTATION SECTO

	(\$17.80)	(\$173.62)	(\$259.93)	\$30.26	\$42.42	\$53.56	\$53.88	\$54.07	\$64.51	\$64.51	\$64.51	\$64.51	\$64.51	\$64.51	\$64.51	\$64.51	\$64.51	\$64.51	\$64.51	\$64.51	\$64.51	\$64.51	\$28.95
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NET PRESENT VALUE

	(\$27.21)																						
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INTERNAL RATE OF RETU

	9.1%																						
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BRITISH COLUMBIA GOVERNMENT SECTOR

Revenues (\$millions)																							
Anzac surcharge	\$0.00	\$0.00	\$1.60	\$11.57	\$14.40	\$12.99	\$12.56	\$12.20	\$12.20	\$12.20	\$12.20	\$12.20	\$12.20	\$12.20	\$12.20	\$12.20	\$12.20	\$12.20	\$12.20	\$12.20	\$12.20	\$5.20	
Coal royalty	\$0.00	\$0.00	\$1.39	\$10.33	\$11.74	\$10.74	\$10.26	\$9.93	\$8.75	\$7.46	\$5.96	\$5.66	\$5.34	\$5.00	\$4.83	\$4.72	\$4.78	\$4.83	\$4.89	\$4.95	\$5.01	\$5.06	\$2.32
Coal lease payments	\$0.34	\$0.34	\$0.34	\$0.34	\$0.34	\$0.34	\$0.34	\$0.34	\$0.34	\$0.34	\$0.34	\$0.34	\$0.34	\$0.34	\$0.34	\$0.34	\$0.34	\$0.34	\$0.34	\$0.34	\$0.34	\$0.34	\$0.34
Corporate income taxes	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Total	\$0.34	\$0.34	\$3.33	\$22.24	\$26.48	\$24.07	\$23.16	\$22.47	\$21.29	\$19.99	\$18.49	\$18.19	\$17.88	\$17.53	\$17.37	\$17.25	\$17.31	\$17.37	\$17.43	\$17.48	\$17.54	\$17.60	\$7.85
Capital Costs (\$millions)																							
Anzac spur line	\$82.40	\$206.00	\$123.60	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
BC Hydro line	\$14.00	\$16.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Highways	\$16.18	\$29.88	\$21.36	\$23.76	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Townsite	\$0.71	\$0.71	\$0.71	\$0.71	\$0.71	\$0.71	\$0.71	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Total	\$113.29	\$252.59	\$145.67	\$24.48	\$0.71	\$0.71	\$0.71	\$0.00	\$0.00														
Net Revenues	(\$112.95)	(\$252.25)	(\$142.34)	(\$2.24)	\$25.76	\$23.35	\$22.44	\$22.47	\$21.29	\$19.99	\$18.49	\$18.19	\$17.88	\$17.53	\$17.37	\$17.25	\$17.31	\$17.37	\$17.43	\$17.48	\$17.54	\$17.60	\$7.85
NPV	(\$304.32)																						
IRR	-3.1%																						

CANADIAN GOVERNMENT SECTOR

Revenues (\$millions)																							
Corporate income taxes	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Capital Costs (\$millions)																							
Navigation aids	\$2.00	\$4.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Highways	\$4.00	\$0.00	\$0.00	\$13.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Total	\$6.00	\$4.00	\$0.00	\$13.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Net Revenues	(\$6.00)	(\$4.00)	\$0.00	(\$13.45)	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
NPV	(\$17.95)																						
IRR	N/A																						
TOTAL NET REV. - NECP	(\$252.80)	(\$735.17)	(\$937.77)	\$54.86	\$115.02	\$142.48	\$126.04	\$125.70	\$102.44	\$65.46	\$22.56	\$14.03	\$4.92	(\$4.88)	(\$9.52)	(\$12.83)	(\$11.18)	(\$9.59)	(\$7.93)	(\$6.28)	(\$4.62)	(\$2.97)	\$2.08
NPV	(\$1,160)																						
IRR	-64.9%																						

COAL PURCHASERS

Competitive Price	\$0.00	\$0.00	\$55.24	\$52.79	\$51.20	\$48.32	\$40.02	\$40.26	\$40.50	\$40.74	\$40.99	\$41.24	\$41.48	\$41.73	\$41.98	\$42.23	\$42.49	\$42.74	\$43.00	\$43.26	\$43.52	\$43.78	\$44.04
Excess coal payments (\$Mn)	\$0.00	\$0.00	(\$14.21)	(\$115.44)	(\$119.43)	(\$123.02)	(\$162.00)	(\$151.07)	(\$126.28)	(\$87.77)	(\$43.28)	(\$33.16)	(\$22.53)	(\$11.14)	(\$4.90)	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Total	\$0.00	\$0.00	(\$14.21)	(\$115.44)	(\$119.43)	(\$123.02)	(\$162.00)	(\$151.07)	(\$126.28)	(\$87.77)	(\$43.28)	(\$33.16)	(\$22.53)	(\$11.14)	(\$4.90)	\$0.00							
NPV	(\$510)																						

Benefit-Cost Analysis of NECP - prepared by N. Knight, Jan/1990

Run description: contract price; all other costs at status quo

to 2003;

Discount Rate	0.10																						
	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
OCL Revenues	\$0.00	\$0.00	\$25.00	\$250.80	\$337.36	\$321.15	\$115.07	\$305.66	\$286.62	\$259.02	\$227.00	\$220.64	\$213.85	\$206.53	\$203.06	\$200.59	\$201.83	\$203.02	\$204.25	\$205.49	\$206.72	\$207.96	\$209.05
OCL Total Costs	\$75.18	\$202.02	\$464.76	\$250.38	\$318.38	\$277.75	\$280.04	\$271.22	\$278.07	\$277.11	\$275.98	\$275.76	\$275.52	\$275.27	\$275.15	\$275.06	\$275.10	\$275.15	\$275.19	\$275.23	\$275.27	\$275.32	\$275.46
OCL Net Revenues	(\$75.18)	(\$202.02)	(\$439.77)	\$0.42	\$18.98	\$43.40	\$35.03	\$34.44	\$8.34	(\$18.09)	(\$18.98)	(\$55.12)	(\$61.68)	(\$68.74)	(\$72.08)	(\$74.47)	(\$73.28)	(\$72.13)	(\$70.94)	(\$69.75)	(\$68.55)	(\$67.36)	(\$17.41)
HOC Revenues	\$0.00	\$0.00	\$70.20	\$148.96	\$130.39	\$109.43	\$101.66	\$101.66	\$97.45	\$88.07	\$77.18	\$75.02	\$72.71	\$70.22	\$69.04	\$68.20	\$68.62	\$69.03	\$69.45	\$69.86	\$70.28	\$70.70	\$71.12
HOC Total Costs	\$10.87	\$103.26	\$125.93	\$109.09	\$102.53	\$87.26	\$86.97	\$86.94	\$89.35	\$89.02	\$88.64	\$88.57	\$88.49	\$88.40	\$88.36	\$88.33	\$88.34	\$88.36	\$88.37	\$88.39	\$88.40	\$88.42	\$88.43
HOC Net Revenues	(\$10.87)	(\$103.26)	(\$55.73)	\$39.87	\$27.86	\$22.17	\$14.69	\$14.72	\$8.10	(\$0.96)	(\$11.46)	(\$13.55)	(\$15.78)	(\$18.18)	(\$19.32)	(\$20.13)	(\$19.72)	(\$19.33)	(\$18.93)	(\$18.52)	(\$18.12)	(\$17.71)	(\$17.31)
Mining Sector Net Revenues	(\$86.05)	(\$305.29)	(\$535.50)	\$40.29	\$46.84	\$65.57	\$49.72	\$49.16	\$16.64	(\$19.05)	(\$60.44)	(\$68.67)	(\$77.46)	(\$86.92)	(\$91.40)	(\$94.59)	(\$93.00)	(\$91.46)	(\$89.87)	(\$88.27)	(\$86.67)	(\$85.07)	(\$34.72)
BCR Revenues	\$0.00	\$0.00	\$3.58	\$23.55	\$29.95	\$28.10	\$28.23	\$28.29	\$30.90	\$30.90	\$30.90	\$30.90	\$30.90	\$30.90	\$30.90	\$30.90	\$30.90	\$30.90	\$30.90	\$30.90	\$30.90	\$30.90	\$30.90
BCR Total Costs	\$19.00	\$19.00	\$66.48	\$10.77	\$13.61	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73	\$12.73
BCR Net Revenues	(\$19.00)	(\$19.00)	(\$62.90)	\$12.78	\$16.34	\$15.37	\$15.50	\$15.56	\$18.17	\$18.17	\$18.17	\$18.17	\$18.17	\$18.17	\$18.17	\$18.17	\$18.17	\$18.17	\$18.17	\$18.17	\$18.17	\$18.17	\$18.17
CNR Revenues	\$0.00	\$0.00	\$8.15	\$53.43	\$67.69	\$63.65	\$63.84	\$63.97	\$69.89	\$69.89	\$69.89	\$69.89	\$69.89	\$69.89	\$69.89	\$69.89	\$69.89	\$69.89	\$69.89	\$69.89	\$69.89	\$69.89	\$69.89
CNR Total Costs	\$28.80	\$19.20	\$120.65	\$46.72	\$55.22	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19	\$38.19
CNR Net Revenues	(\$28.80)	(\$19.20)	(\$112.50)	\$6.71	\$12.47	\$25.65	\$25.78	\$25.78	\$31.70	\$31.70	\$31.70	\$31.70	\$31.70	\$31.70	\$31.70	\$31.70	\$31.70	\$31.70	\$31.70	\$31.70	\$31.70	\$31.70	\$31.70
Port Revenues	\$0.00	\$0.00	\$2.23	\$16.16	\$20.41	\$19.10	\$19.10	\$19.10	\$21.00	\$21.00	\$21.00	\$21.00	\$21.00	\$21.00	\$21.00	\$21.00	\$21.00	\$21.00	\$21.00	\$21.00	\$21.00	\$21.00	\$21.00
Port Total Costs	\$0.00	\$135.42	\$86.75	\$5.39	\$6.80	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37	\$6.37
Port Net Revenues	\$0.00	(\$135.42)	(\$84.53)	\$10.77	\$13.61	\$12.73	\$12.73	\$12.73	\$14.64	\$14.64	\$14.64	\$14.64	\$14.64	\$14.64	\$14.64	\$14.64	\$14.64	\$14.64	\$14.64	\$14.64	\$14.64	\$14.64	\$14.64
Transport Sector Net Rev.	(\$47.80)	(\$173.62)	(\$259.93)	\$30.26	\$42.42	\$53.56	\$53.88	\$54.07	\$64.51	\$64.51	\$64.51	\$64.51	\$64.51	\$64.51	\$64.51	\$64.51	\$64.51	\$64.51	\$64.51	\$64.51	\$64.51	\$64.51	\$64.51
BC Govt. Revenues	\$0.34	\$0.34	\$3.33	\$22.24	\$26.48	\$24.07	\$23.16	\$22.47	\$21.29	\$19.99	\$18.49	\$18.19	\$17.88	\$17.53	\$17.37	\$17.25	\$17.31	\$17.37	\$17.43	\$17.48	\$17.54	\$17.60	\$17.65
BC Govt. Total Costs	\$113.29	\$252.59	\$145.67	\$24.48	\$0.71	\$0.71	\$0.71	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
BC Govt. Net Revenues	(\$112.95)	(\$252.25)	(\$142.34)	(\$2.24)	\$25.76	\$23.35	\$22.44	\$22.47	\$21.29	\$19.99	\$18.49	\$18.19	\$17.88	\$17.53	\$17.37	\$17.25	\$17.31	\$17.37	\$17.43	\$17.48	\$17.54	\$17.60	\$17.65
Canada Govt. Revenues	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Canada Govt. Total Costs	\$6.00	\$4.00	\$0.00	\$13.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Canada Govt. Net Rev.	(\$6.00)	(\$4.00)	\$0.00	(\$13.45)	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
NECP - NET REVENUES	(\$252.80)	(\$735.17)	(\$937.77)	\$54.86	\$115.02	\$142.48	\$126.04	\$125.70	\$102.44	\$65.46	\$22.56	\$14.03	\$4.92	(\$4.88)	(\$9.52)	(\$12.83)	(\$11.18)	(\$9.59)	(\$7.93)	(\$6.28)	(\$4.62)	(\$2.97)	\$2.08
Coal Purchasers Costs	\$0.00	\$0.00	(\$14.21)	(\$115.44)	(\$119.43)	(\$123.02)	(\$162.00)	(\$151.07)	(\$126.28)	(\$87.77)	(\$43.28)	(\$33.16)	(\$22.53)	(\$11.14)	(\$4.90)	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
NPV of Costs	(\$510)																						

SUMMARY TABLE OF RESULTS (Millions of 1980\$C)

	NPV of Gross Bc	NPV of Gross Cs	NPV	IRR
Quinette Coal Ltd.	\$1,665	\$2,337	(\$672)	-135.1%
Bullmoose Oper. Co.	\$638	\$777	(\$139)	-232.0%
Mining Sector Total	\$2,303	\$3,113	(\$811)	-172.5%
BC Railway	\$189	\$163	\$26	13.9%
CN Railway	\$427	\$391	\$36	13.1%
Ridley Island Port	\$128	\$217	(\$89)	2.1%
Transport Total	\$744	\$771	(\$27)	9.1%
BC Govt. Sector	\$135	\$439	(\$304)	-31.4%
Canada Govt. Sector	\$0	\$18	(\$18)	N/A
Adjustments Sector				
TOTAL			(\$1,160)	-64.9%

APPENDIX 6B

METALLURGICAL COAL MARKET STUDIES

This appendix summarizes the major market studies commissioned or consulted by the Economic, Finance and Marketing Analysis Subcommittee of the NECP planning group. The list of studies was obtained from the report, A Benefit-Cost Analysis of North East Coal Development (BC 1982a). Not all studies listed in that document were publicly available, and so additional market analyses were also reviewed. Summaries of these additional reports are in the latter part of the appendix.

1) **Rio Tinto North American Services Ltd., World Coking Coal Supply Study, 1976.**

This study was commissioned by the NECP planning task force. The terms of reference requested an estimate of the potential supply of metallurgical coal, at various costs, until 1995.

The report concluded that, **excluding B.C. production**, world exports of metallurgical coal could increase from 97 MMT in 1975 to 256 MMT in 1995. The largest proportion of this 159 MMT increase in capacity would come from the USA (54 MMT) and Australia (44 MMT). The report noted that the USA production would enjoy a significant cost advantage because rail and port infrastructure is already in place, and most of this new capacity could come on stream for costs in the range of \$52.00 to \$57.00 per MT FOB (1976\$US). In addition, the report noted (p. 14) that approximately one-third of metallurgical coal produced in the USA was used in domestic processes other than coke manufacture. If metallurgical coal prices were to rise sufficiently, some or all of these 59,832,000 short tons could be switched into the metallurgical coal market. The cost of this coal would be significantly less than new production.

The report estimated that 19 MMT of the projected Australian increases in production could come on stream at the low cost of approximately \$40/MT (1976\$US) because of the proximity of existing transportation infrastructure. The remaining 25 MMT of capacity would cost \$56.00/MT or more to bring on stream because of the requirements for new infrastructure.

The JSI's requirements for metallurgical coal imports were broadly addressed in this report. It was noted that the JSI had not yet recovered from the 1975 recession and at that time had sufficient coal under contract to cover its immediate requirements. The author argued that this meant that the JSI, which had been strongly encouraging new coal mining projects by offering financing as well as long term contracts, was now becoming reluctant to invest in raw material sources.

In the short term they are likely to give priority to encouraging incremental expansion or new mines which can be self-financed or require minimal external finance. They are less likely to consider large coal mining projects involving considerable infrastructure financing and large external borrowing. (p. 37).

The latter projects "...could result in higher levels of coking coal prices than the Japanese are willing to contemplate at present." (p.37).

The study also examined prices for US metallurgical coal exports, noting the large increases between 1974 and 1976 on contracted prices (from approximately \$40/MT to \$60/MT in nominal terms), and the panicky trends in spot prices (ranging between \$42/MT and \$62/MT for medium volatile coal with some spot prices exceeding \$100/MT in 1974). The study argued these dramatic price increases were based on:

- a) the energy price increases in 1973 caused the US government to direct power utilities to switch to coal from oil,
- b) in 1974 there was an unprecedented boom in the steel industry resulting in high spot prices,
- c) during the period there was high inflation in coal mining costs, and labour disruptions decreased supply, and
- d) due to environmental regulations, US utilities were required to use low-sulphur coal.

2) Sivertson, L. and J. Clancy 'Resource Depletion and Future Coking Coal Prices' BC Institute for Economic Policy Analysis, April, 1976.

This report investigated the fundamental determinants of metallurgical coal prices to determine whether the recent spectacular price increases would be sustained in the future. The report concluded that prices should be expected to fall in the future, as the market fundamentals would not support the current high prices for an extended period of time.

The authors developed a model of coal prices based on supply costs and scarcity rents (using US information, so all estimates were in 1975US\$). They estimated the length of time required to exhaust current metallurgical coal reserves in the western world, given a fairly high rate of growth in demand (3%/yr.); the time to exhaustion was estimated to be 70 years. The costs of producing this coal was estimated to be about \$20.00/LT. The scarcity rent was estimated to be about \$2.00/LT. Under the base case analysis, which was conservative in that it kept costs at the same real price level, did not allow any technological change, and used a relatively high-cost alternative technology to estimate the scarcity rent, the equilibrium price estimated by the model for 1975 was significantly less (more than \$25/LT less) than the market price during that year. The authors then changed the model's assumptions to try to generate a higher equilibrium price. They made the cost of alternative technology to metallurgical coal 5 times their previous estimate to increase the scarcity rent component of the equilibrium price, and they allowed production costs to take a quantum leap half way through the 70 year time period (production costs increasing from about \$20.00/LT to \$100.00/LT). The new equilibrium price for 1975 was about \$31.00/LT, still far below the going price in 1975 of \$50.00/LT.

The authors concluded that

... the message is clear: current coking coal prices do not reflect their scarcity value, they are much above the long-run equilibrium level. We should expect them to fall and fall considerably as new coal deposits are brought into production. (p. 40).

The authors concluded metallurgical coal prices were not high because the world was running out of coal, but because of a number of circumstances, including the Vietnam War, the OPEC cartel's actions regarding oil prices, and increased environmental and safety regulations in the USA. The authors argued the impact of these forces was spectacular but would be short-lived.

The authors advised that new coal mines should not be encouraged unless they can survive at prices of \$25.00/LT FOB mine.

3) **Sivertson, L. Future Markets and Prices for North East British Columbia Coking Coal. Victoria: Ministry of Economic Development, April and October 1977.**

The author argued that several key questions needed to be answered before the northeast coal developments should proceed, such as: where is world demand going? what is happening in supply expansion? what are BC's potential markets? how competitive is BC's coal? and does the security of supply argument mean BC will get more of the Japanese market?

Global imports of metallurgical coal were projected to grow to 200 MMT by 1990. Japan's imports were projected to be 66.5 MMT in 1980, 81 MMT in 1985 and 97 MMT in 1990. The author noted that these estimates were based on revisions of earlier estimates by the federal Department of Industry, Trade and Commerce which suggested Japanese crude steel production would be between 140 and 151 MMT in 1980 and 172 to 178 MMT between 1985 and 1990. The author suggested Japanese crude steel production would be 128 MMT in 1980, 153 MMT in 1985 and 181 MMT in 1990. The more pessimistic forecasts were based on a number of factors, including the recent recession, the decline in the Japanese shipbuilding industry, increased protectionism in major markets for Japanese steel and other products, and decreased domestic consumption in Japan.

The report argued that potential exports, indicated by the RTNAS (1976) study of expansion projects and plans, could exceed demand: thus the key issue will be relative costs of metallurgical coals. The author argued that the world coal industry is relatively competitive and so prices should follow marginal costs. It was argued that the recent short-run pressures on demand and price would not last, and that prices would decline in the future, although not likely below the 1970 level.

The author argued that offers of secure supplies to the Japanese steel industry appeared to be rewarded through long-term contracts with take specifications, but not price differentials.

In the author's analysis of world costs, he found that there were considerable supplies available at approximately \$53.00/MT, and that this supply was more than the projected demand. Given this, the northeast BC developments were questionable, i.e. they were higher cost producers than this.

The author argued there would be little opportunity for expansion in BC before 1990. He reported that BC government officials had told the Minister of Industry, Trade and Commerce in November 1976 meeting that the JSI had informed BC that the JSI was committed to pursuing a 30-30-30 strategy, where 30% of the JSI's metallurgical coal would be purchased from each of Australia, Canada and the USA. Denison also reported that the JSI had informed them of this strategy. The author suggested that if this was the case, there would be an oversupply situation in the JSI market during the 1980s, and as a result there would be downward pressure on prices.

3) **Stanford Research Institute, Metallurgical Coals and Coke, 1978.**

This study was not commissioned by the NECP planning task force, but was consulted for estimates of the JSI's coking coal requirements by the Economic, Finance and Marketing Analysis Sub-Committee.

This study noted that steel production and consumption in Japan declined steadily after the peak levels achieved in 1973, and that the JSI was not optimistic about the recovery of growth in domestic consumption. The JSI's expectations were based on the continuing weakness in domestic capital spending and in steel-intensive export industries, and the Yen's rising value which affects the price competitiveness of steel-intensive consumer goods exports. The SRI study team, in agreement with these general trends, forecast that growth in domestic consumption would be much slower than previously experienced (2.8%/yr. in 1980-2000 period versus 9.1%/yr. in 1956-1976), and that Japanese steel exports would also experience slow growth rates as former importers of Japanese steel developed domestic steel-making capability, and as environmental and land use constraints intensified in Japan.

Based on these assumptions, the SRI study team forecast an absolute increase of 53.5 MMT of steel production in Japan over the period 1980-2000. However, the impact of this on the JSI's metallurgical coal requirements was not expected to be proportional as technological developments in steel-making were expected to lower the coke/steel ratio. Consequently, import requirements for metallurgical coal were projected to increase at a slower rate than steel production. The SRI study team estimated the JSI's import requirements would be 85 MMT for 1985.

4) **Rio Tinto North American Services Ltd. World Coking Coal Technological Development. 1978.**

This study was commissioned by the NECP planning task force. The terms of reference required examination of how technological developments in coke making would affect demand for metallurgical coal, paying special attention to the Japanese market.

The concensus among industry representatives was that the briquetting process could reduce the use of premium grade coking coal in the future. Briquetting widens the range of coals that can be used to make coke, allowing less expensive coals to be used, which partially restrains increases in the cost of premium quality coals. Coals suitable for briquetting were approximately \$30.00/MT to \$36.00/MT in 1977 (US\$FOB).

The report noted that Japan had spent considerable resources in investigating and installing briquetting capabilities at their steel mills. The author noted that the Japanese had anticipated a shortage of coking coal in the 1960s and had started investigating briquetting as a means of controlling costs. The price of imported coking coal to Japan increased by 250% between 1971 and 1975, and the Japanese began seeking new sources of cheaper coal to use in briquetting. The author suggested (p. 11) that the Japanese steel mills changed their objectives in metallurgical coal sourcing, and that now "...the lowest delivered price of coal having minimum quality requirements is the operative criterion." This was compounded by the general recession in the steel industry and Japan's surplus of metallurgical coal under contract in the mid-1970s.

5) **Jones, R.L. and Sivertson, L.E. Pacific Rim Metallurgical Coal Market Survey. Ottawa: Department of Industry, Trade and Commerce, 1979.**

This report, completed for the NECP planning task force, was undertaken by employees of the federal and provincial government. It updated an earlier report, the World Coal Market Survey, and focused more closely on metallurgical coal demand in the Pacific Rim. The stated purpose was to provide information for the assessment of the economic viability of additional metallurgical and thermal exports from British Columbia and Western Canada.

The authors noted that since the earlier market study in 1976 there had been rapid changes in the steel market. In 1976 the JSI had anticipated high growth in steel demand, growing from 108 MMT in 1976 to 140 MMT in 1980 and 172 MMT in 1985. In August 1978, the JSI was much more pessimistic, forecasting 110 MMT of steel demand for 1980 (p. 8). The lower demand resulted from a levelling off of domestic consumption and a decline in exports. The lower domestic consumption resulted from a decline in shipbuilding between 1973 and 1977, slow growth in the auto industry, and slackening in private equipment investment. Lower steel exports were due to import restrictions in major markets and the appreciation of the Japanese yen (pp. 9-11). The authors did not anticipate dramatic shifts from this situation and agreed with the JSI forecast of steel production in 1980 of 110 MMT, and suggested 1985 production would be 120 MMT.

Given this lower level of forecast steel production, metallurgical coal imports were not expected to increase very much. In 1978 the JSI had 57.8 MMT of metallurgical coal under contract (p. 15), and if all existing and expected contracts came into being the JSI would have 69 MMT under contract by 1985. The report argued that this contracted volume would be sufficient to meet the JSI's requirements, and so no new metallurgical coal supply was required.

Should steel production reach 130 MMT by 1985, the report argued the JSI would only require an additional 6 MMT of metallurgical coal (p. 12). To meet these potential additional requirements, the JSI could choose from approximately 20 MMT of new capacity in various countries. Of the new capacity, Australian mines possessed a clear cost advantage because the mines are close to tidewater and so transportation costs are very low (\$1.50/MT compared to \$10.00/MT in Canada). The authors argued that

...additional coal supplies for Japan will likely first come from areas with existing infrastructure, because of cost considerations...(Canada's) major advantage is that steel mills want to rely more on Canadian suppliers. Still, commercial considerations predominate. (p. 18)

The authors assessment of which coal mines in Canada could capture some of the additional demand, should it arise, suggested it would not be new mines from northeastern BC.

There does not appear to be a consensus on which new projects in Canada would likely get the nod. Size and low cost appear to be prime factors in the choice. The appropriate scale for new projects appears to be not more than 2×10^6 tonnes. A project of $4 - 5 \times 10^6$ tonnes is too large now. (p. 18).

An additional consideration, the authors argued, was whether the JSI would cancel some of its existing metallurgical coal contracts because of poor contract performance or high prices. They suggested this could potentially open up an additional 35 MMTPY of demand (p. 13). However, the authors judged this to be an improbable outcome, and suggested contract terminations would probably only result in an additional demand of 0 - 5 MMTPY (p. 19). In their judgement,

Canada is in a good position to acquire a portion of this additional tonnage requirement, likely with mine expansion. Competition will be intense, however, as Japan has 5.8×10^6 tonnes of mine expansion capacity, and 14×10^6 tonnes of new mine capacity vying for the business. (p. 22)

Finally, the authors reported that other Pacific Rim countries were expected to expand their steel production by the 1990s. Overall, they suggested an additional 90 MMT of steel production capacity could be in place, which in their judgement would require 60 MMT of metallurgical coal. However, most of the expansion in steel production was slated for the developing countries, and the ability of Canadian metallurgical coal exports to capture some of this market was deemed to depend on the competitiveness of Canadian coal (p. 6), and on the ability of these countries to develop indigenous sources of metallurgical coal.

Overall, then the report indicated little growth in the JSI's requirements for metallurgical coal, and stressed the importance of cost competitiveness to capturing any increased demand for metallurgical coal in the Pacific Rim. Clearly, based on this, the NECP would not be economically viable.

6) **Kittredge, P. and L.E. Sivertson. 'Competition and Canadian Coal Prices in the Japanese Coking Coal Market'. CIM Bulletin (1979):100-108.**

The authors examined whether BC coals were underpriced because of the dependence of BC on the Japanese market and the assumed buying power this gave the JSI. They developed a model of coal prices based on coal quality characteristics and certain economic characteristics of the market arrangements, and then compared the predicted prices for BC's coals with the actual prices paid in 1977. The authors concluded that BC coals were not underpriced. In particular, the Balmer and Fording coals were very competitively priced.

The authors suggested the policy implications of their results were that quasi-integration (where buyers become equity participants in the supply industry) did not appear to have a negative effect on prices in the metallurgical coal industry, i.e. the potential for non-arms-length transactions was not utilized in 1977. Therefore, buyers did not appropriate resource rents during that year. In addition, selling to one buyer did not appear to negatively affect the prices received. Diversification of buyers for BC coal, therefore, should not be expected to increase prices received, although it may increase stability of sales.

7) **B.C. British Columbia Coal Development. Victoria: Ministry of Industry and Small Business Development, 1980.**

This report projected global metallurgical coal imports would increase from 119 MMT in 1980 to 170 MMT in 1985 and 199 MMT in 1990. Japanese imports were projected to grow from 56 MMT in 1980 to 72 MMT in 1985 and 80 MMT in 1990. The study noted that there was the potential to develop 34 MMT of export potential from Canada by 1990, and argued there was 32 MMT of market potential for western Canadian metallurgical coals. Of this 32 MMT of market potential, 19 MMT was in the Japanese market. This implied that western Canadian producers could diversify their sales to where only 59% of total sales would go to Japan in 1990.

Exports to Japan were projected to increase from 10 MMT in 1980 to 16 MMT in 1985 and 19 MMT in 1990. The projected share of the JSI market obtained by western Canadian coals in 1990 was 23.75%, with the remainder taken by Australia (43%), the USA (12.5%), the USSR (10.6%), China (5%), South Africa (5%), and other countries (2.5%).

8) **Patching et al. Western Canada's Coal. Calgary: Canada West Foundation, 1980.**

This report was not commissioned by the NECP planning task force, but was referred to for an assessment of Japanese metallurgical coal demand.

The authors of this report believed that offshore metallurgical coal markets would not strengthen until the early or mid 1980s, stating that "...supply is expected to exceed demand until sometime in the early 1990s." (p.81).

Noting that the offshore markets for western Canadian metallurgical coal are closely tied to the health of the world steel industry, the report examined technological changes in steel-making that were reducing metallurgical coal requirements. The technological changes included: continuous casting, supplemental fuel injection, blending of coals, making formed coke, and more efficient blast furnace operation (pp. 76-77). In addition, the report noted the dramatic reallocation of geographic production of steel in the 1970s, with production moving to countries in the Eastern Bloc, newly industrializing areas, and the 'third world'. Declining production was experienced in North America, the European Economic Community and Japan (p. 80).

Reviewing these trends led the authors to conclude the mid-1970s projections regarding steel production and consumption were overly optimistic, and thus projections for metallurgical coal demand were also too high. Based on a reconsideration of global growth rates in steel production,¹ they suggested total JSI demand for metallurgical coal would be 63 MMT in 1980, 70 MMT in 1985 and 79 MMT in 1990 (p. 81), representing an increase of 16 MMT in the 1980s. If Canadian producers were successful in capturing some of this potential increase in demand, they could increase exports from 12 MMT in 1980 to 18 MMT in 1990, an increase of 6 MMT.

If western Canadian coal producers were successful in accessing other market areas, potential sales could increase to 13.8 MMT in 1980, 19.3 MMT in 1985 and 26 MMT in 1990, an increase of 12.2 MMT in the 1980s. However, the authors noted the importance of the cost competitiveness of metallurgical coal from Western Canada in accessing these markets.

9) **WOCOL. Coal: Bridge to the Future. 1980.**

The WOCOL study was referred to by the NECP planning task force for an assessment of the JSI's metallurgical coal demand in the 1980s.

The WOCOL study team forecast metallurgical coal imports based on assumed growth rates in the Japanese economy and the resulting levels of steel production. Two growth rates were considered, 4.1%/yr. increase in the GNP and 4.6%/yr. increase. Based on this, steel production was projected to increase from 101 MMT in 1977 to 130 - 135 MMT in 1985, and 135 - 140 MMT in 1990. This produced a demand for metallurgical coal imports of 73 - 76 MMT in 1985 and 77 - 79 MMT in 1990.

The study team forecast that Canada would export 15 mtce/yr. of metallurgical coal in the 1980s, with all of it going to Japan (p. 299).

¹ Note that these projections were based on Japan maintaining its market share of steel production until 1990. The resulting growth in coal demand was 2.2%/yr. in the first half of the 1980s, and 1.0%/yr. in the second half.

Other studies available to the NECP planning task force, but not referred to in the cost-benefit analysis (BC 1982a) were:

1) **British Columbia. Report of the Coal Task Force. Victoria: Queen's Printer, 1976a.**

This study is indicative of the optimism prevalent in the mid-1970s regarding future demand for metallurgical coal. Projections were based on rates of industrial growth, with particular attention to growth in the steel industry. For example, the report assumed that Japanese steel-making capacity would continue to increase until the late 1980s, stabilizing at 190 MMT. Steel-making capacity was projected to be 147 MMT in 1980, 176 MMT in 1985 and 190 MMT in 1990. Metallurgical coal demand would increase from 88 MMT in 1980 to 105 MMT in 1985 and 112 MMT in 1990. The report's authors concluded this enormous increase in Japanese demand, combined with the forecast global increases, would provide a ready market for BC coal and would allow BC to diversify its markets.

This report acknowledged that technological changes in coke-making would gradually lessen and eventually remove the demarcation between metallurgical and thermal coals. However, the authors argued this change would affect low-volatile coals first (the most expensive coals, primarily obtained from the USA) and so BC coals would be protected from any negative price implications in the short run. However, it implies that there will be lowering of the market-clearing price for metallurgical-grade coals over the long term.

2) **Dames and Moore, A Report of the Current Status of the Canadian Coal Mining Industry, 1977**

The authors of this industry-based publication noted the phenomenal growth in the JSI had resulted in metallurgical coal imports in 1975 (62 MMT) that were 7 times greater than the 1960 import level. The authors suggested that the JSI were planning further expansion in steel production and consequently would require more coal imports (p. 8). However, the authors expected some stabilization in the near term, requiring cutbacks in metallurgical coal imports and price reductions in the 1977/78 fiscal year (p. 10). Recent projections examined by the authors suggested JSI metallurgical coal requirements would be approximately 67 - 70 MMT in 1977. The JSI had about 78 MMT under long term contracts at the time (p. 10). Against this background, the authors noted that Western Canada has neither the best nor the cheapest coal.

3) **Robinson Dames and Moore, Canadian Coal Industry Report, 1980**

This report was a follow-up to the 1977 edition. The authors noted that projections regarding metallurgical coal required by the JSI varied considerably. A Japanese marketing company put demand at 65.5 MMT by 1985, a spokesperson for Nippon Steel forecast demand at 74-77 MMT by 1985, the WOCOL report suggested demand would be in the range of 73-76 mtce, and the market study by Jones and Sivertson forecast demand would be between 69.1 and 74.9 MMT (p. 59). If Canadian suppliers increased their market share to over 20% of the Japanese market, metallurgical coal exports of 14 MMT would be achieved by 1985. Interestingly, this projection was based on a total metallurgical coal demand of 70 MMT, 10% of which was assumed to be sourced domestically.

Metallurgical coal prices were rising at this time. In the 1978 fiscal year, metallurgical coal from western Canada sold for \$58.17/MT. In 1979, the price decreased to \$55.61/MT, but then climbed dramatically to \$62.94/MT in 1980 and \$66.98/MT in 1981 (p. 61). During this time, proposed prices for northeast coal were reported to be around \$85.00/MT, indicating the Japanese were either expecting huge increases in metallurgical coal prices, or were willing to pay a premium for bringing a new supply source onto the market.

4) **Shaffer and Associates, Socio-Economic Impacts of the Western Canadian Coal Industry, 1980 (Background report for Patching et al. Western Canada's Coal: The Sleeping Giant, 1980).**

This document was a background report for Patching et al.'s (1980) analysis of future prospects for western Canada's coal industry. The authors' analysis of potential markets for metallurgical coal started with a critique of an existing report that projected exports of 26 MMT by 1990, an increase of 12.2 MMT over 1980 exports. The projection was considered overly optimistic because it assumed growth in steel production that did not account for recent downward trends, it did not assume any further downward trends in the coke/steel ratio, and it assumed Canada would increase its market share despite lower cost supplies available elsewhere (p. 21). By simply changing the latter two assumptions to reflect historical trends, the export estimate was reduced to 18.7 MMT in 1990, meaning that exports would only increase by 4.9 MMT during the 1980s. The authors also note that the federal government's most optimistic scenario for metallurgical coal exports from western Canada was for 21 MMT by 2000; the pessimistic scenario forecast no increase in exports.

The authors also noted that the question of growth in coal markets was crucial to the justification of the NECP, especially because of government involvement in providing infrastructure. British Columbia's infrastructure policy states the government will only get involved where prices are sufficient to cover mining costs and the costs of infrastructure not covered by the Province (p. 36).

5) **International Iron and Steel Institute, Future Supplies of Coking Coal, 1981**

The authors calculated that, based on the estimated supply of metallurgical coal available, the potential production of pig iron in 1985 could be approximately 400 MMT (p. 5). The previous peak in pig iron production was 351 MMT in 1974; only 342 MMT was produced in 1979. This suggested an oversupply of metallurgical coal in the 1980s, barring disruptions in supply.