Industrial Development Subsidiary Agreement

COMMERCIAL DEVELOPMENT OPPORTUNITIES RELATING TO HAT CREEK COAL AND VALLEY COPPER

DECEMBER 1981

Research Report

Province of British Columbia
Ministry of Industry and Small Business Development

Government of Canada
Gouvernement du Canada

Regional Economic Expansion
Expansion Économique Régionale

COMMERCIAL DEVELOPMENT OPPORTUNITIES RELATING TO HAT CREEK COAL AND VALLEY COPPER

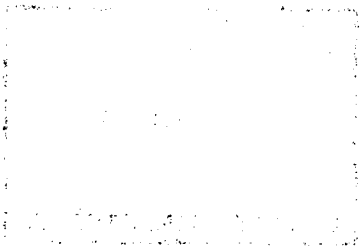
DECEMBER 1981

Prepared for:

THE THOMPSON-NICOLA REGIONAL DISTRICT

Prepared by:

THOMAS CONSULTANTS INC.



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The responsibility for the content of this report is the consultant's alone, and the conclusions reached herein do not necessarily reflect the opinions of those who assisted during the course of this investigation or the Federal and Provincial Governments which funded the study.

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EXECUTIVE SUMMARY

PART I - HIGHLAND VALLEY OPPORTUNITY ANALYSIS

The objective of Part I is to identify potential economic development opportunities in the Villages of Ashcroft, Cache Creek, Clinton and Lillooet, resulting from the Highland Valley mining projects.

The intended approach to accomplish this objective entails a general analysis of the copper market, followed by a detailed analysis of the existing and planned mining projects in the Highland Valley. The determination of the net increase in activity in the entire Highland Valley mining sector would provide the basis upon which to identify potential economic development opportunities.

The major source of documented information for this portion of the study has been the Valley Copper Stage II Report, Volume 4, Socio-Economic Impact of the Project. The information contained in this report has been supplemented by interviews with representatives of the mining companies involved in the Highland Valley, industrial suppliers to the Highland Valley, the CPR and the CNR, the Ministry of Industry and Small Business, as well as regional and municipal government officials.

The first component of this sector, the general analysis of the copper market, has been based on information supplied from all sources consulted.

The data required for the second portion of the study was mainly derived from the Valley Copper Project Stage II Report and from interviews with representatives of Bethlehem Copper, Dekalb Mining Corporation, Highmont Mining Corporation, Lornex Mining Corporation and Valley Copper Mines Ltd.

A detailed analysis of Highland Valley mining activities over the period from the present to 1987 reveals a minimal net increase in employment resulting from expansion in the mining sector. Therefore, the identification of specific economic development opportunities is precluded by this finding.

Accordingly, the third component of the study, opportunity identification, has been limited to a discussion of potential industrial development opportunities.

In the face of a "no-growth" scenario we have, notwithstanding, tried to accomplish our objectives. It is hoped that the following discussion of the Highland Valley mining activities will provide some further insight into the local Highland Valley economy.

As no specific development opportunities were identified, an analysis of infrastructure needs has been precluded.

PART II - HAT CREEK THERMAL POWER PROJECT OPPORTUNITY ANALYSIS

The objective of this part is to identify potential economic development opportunities for the Villages of Ashcroft, Cache Creek, Clinton and Lillooet, resulting from the Hat Creek Thermal Power project.

The intended approach to the accomplishment of this objective was threefold: The first section would be a general analysis of the Hat Creek project and the factors affecting the likelihood and timing of its future development. The second section would provide a detailed analysis of the project, including the composition of the direct labour requirements in order to assess the resulting increases in the population level of the study area. The third section would employ the data outlined in the second section in the identification of commercial development opportunities resulting from the project.

The major source of documented information for this study has been British Columbia Hydro and Power Authority's Detailed Environmental Studies. The information contained in this document has been supplemented by interviews with representatives of B.C. Hydro, the Ministry of Industry and Small Business Development, the Ministry of Energy, Mines and Petroleum, H.A. Simons (International) Ltd., as well as with regional and municipal government officials, and the B.C. Coal Co-ordinator.

The first component of the study, the general analysis, has been based on information gathered from all sources consulted. It is our opinion that sufficient data has been made available to outline the factors affecting the likelihood and timing of the proposed power plant.

The data required for the second section of the study, which entails a summary of the relevant project details, is not available in sufficient detail at this time. Strong Hall and Associates Ltd., Cornerstone Planning Group Ltd., and Urban Systems Ltd. completed an

inventory of social and economic conditions existing in the study area during 1978. However, the more recent portion of the Strong Hall and Associates Ltd. study, which assesses the impact of the Hat Creek project on the existing conditions of the study area, will not be available until 1982.

In addition, there has been a recent rescheduling in the phasing of the four 500-megawatt generators which necessitates the revision of B.C. Hydro's labour requirements for the project. Accordingly, the sections outlining Socioeconomic Conditions, Community Resources, and Social Environment in the Detailed Environmental Studies will be updated by B.C. Hydro during the spring of 1982.

In view of the foregoing discussion, it is evident that the socioeconomic data currently available is out of date, and that reliable statistics are not yet available. Furthermore, it has been suggested to us by B.C. Hydro that the socioeconomic data currently available should be used with caution.

As stated previously, it was intended that the data outlined in the second section would provide the basis for the identification of possible economic development opportunities in the third section. The importance of accurate base data cannot be overstated in the process of identifying commercial development opportunities, which involve the application of standard industry multipliers to the data provided by B.C. Hydro. When employing this multiplier process, any errors in the base data employed become magnified in the final product. It is for this reason that we are unable to identify specific economic development opportunities resulting from the Hat Creek project.

Notwithstanding the inadequate base data, we have tried to accomplish the objective and hope that the following discussion of the Hat Creek Power project will provide some further insight into the identification of development opportunities resulting from its future development.

Industrial development opportunities within the local study area can only be identified when B.C. Hydro publishes a detailed study of equipment purchasing and servicing patterns. However, preliminary studies indicate that the project will have a relatively low indirect job generation rate, and that approximately 35 indirect jobs will be created due to project expenditures on goods and services, most of which will be concentrated in Kamloops.

Commercial development opportunities have been identified in terms of employment associated with consumer spending patterns of the project's direct employees. Accordingly, the following increase in the demand for retail space in the study area has been calculated, based on the direct project employment isolated within the local study area.

Village	DSTM Floorspace Requirement Sq.Ft.	Convenience Floorspace Requirement Sq.Ft.
Ashcroft	17,448	8,724
Cache Creek	17,448	8,724
Clinton	6,540	3,270
Lillooet	2,184	1,092
	43,620	21,810

Thus, the total retail potential generated in the study area due to the Hat Creek project is 65,430 sq.ft.

The DSTM category includes apparel, hardware, home furnishings and general merchandise, while the convenience category includes food, drugs and personal services.

PART I
HIGHLAND VALLEY OPPORTUNITY ANALYSIS

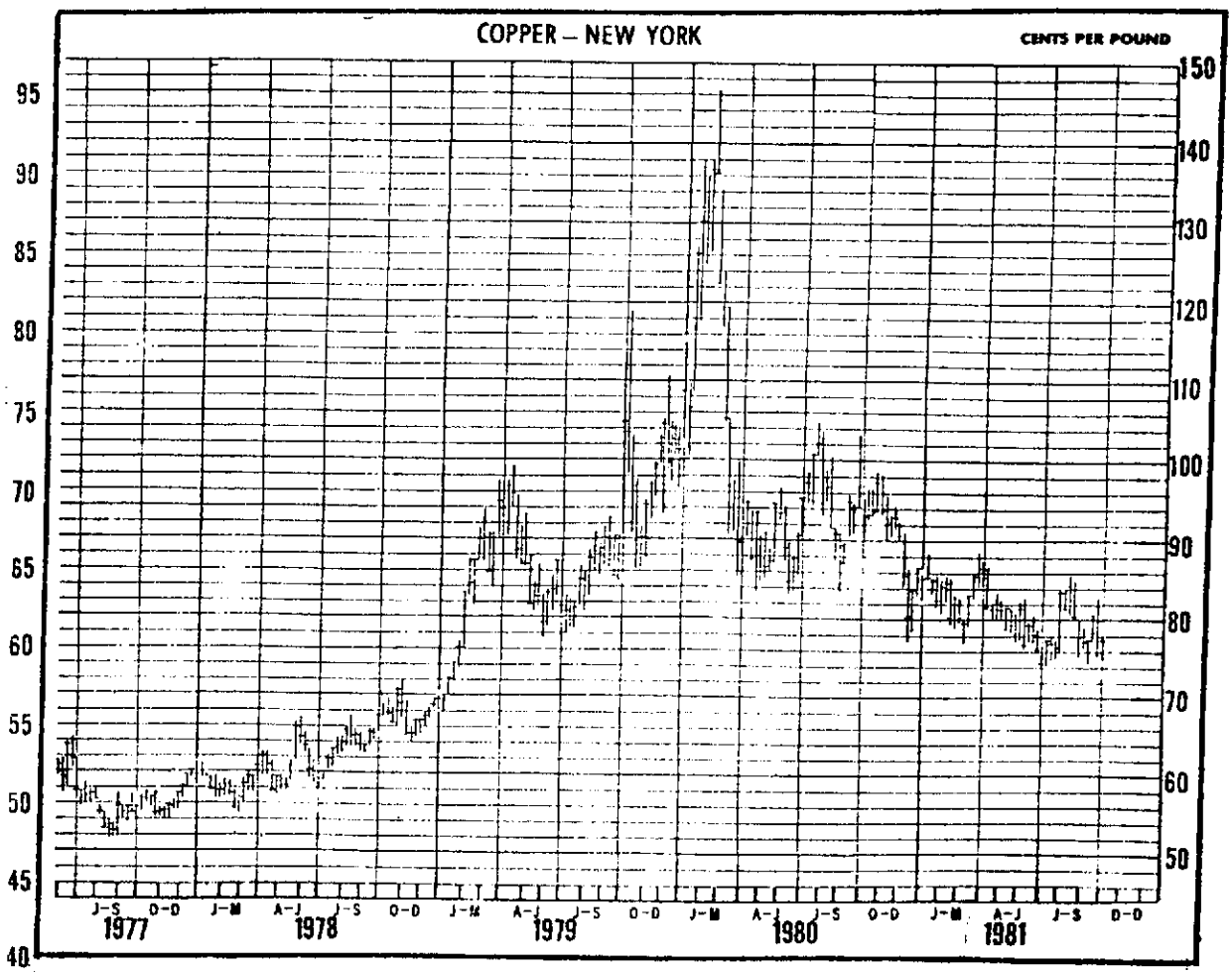
SECTION 1

PROJECT BACKGROUND

1.1 THE COPPER MARKET

An historical analysis of copper prices reveals the highly cyclical nature of the market for copper.

FIGURE #1



While it is generally agreed that the price of copper is affected by the worldwide economic climate, analysts provide the following explanation for the drastic decrease in the price of copper during 1980.

> The year began well with the price of copper surging upwards during January and the first half of February. To an extent, this was undoubtedly a reflection of the soaring gold price, and North American copper producers set record prices for copper. The buoyancy was sustained by the high number of contracts outstanding, the knowledge that inventories were normal, demand was holding up, and future supply from Chile and Africa looked shakey.
>
> In the midst of this upward price pressure, Metals and Minerals Research Services of London, England concluded that production capacity "was much more than adequate to meet all but the most optimistic demand growth forecasts." Despite a nationwide copper workers strike in the United States there was more than a sufficient supply of metal throughout the year.
>
> When word got around that the striking unions had agreed to resume negotiations, the price of copper, which had already slipped, dropped sharply. The rash of sell orders of the New York and London hedge markets forced the price down and the situation was soon reflected by substantial decreases in producer prices.[1]

In examining the copper market, it is important to note the metal's uses, and how these are changing. The largest uses for copper are in electrical wire and cable and brass mill products. Consequently, the metal's main markets are in the housing and automotive industries, and to a lesser degree, the shipping industry. In acknowledging such changes, it should be noted that as conventional automobiles become more efficient, there is a resultant decrease in the demand for copper components. This is offset to some extent, by increased demand for copper in roofing, solar heating, electric automobiles, and cupro-nickel for ship hulls.

1 The Northern Miner Press, November 27, 1980.

1.2 FUTURE OUTLOOK

Industry officials and market analysts anticipate a slight improvement in copper prices during 1982. The market for this metal is highly cyclical and industry officials anticipate that the current depressed state of the market will continue in the short term.

While the inventory of copper is presently at a seven year low, it is not expected to have a major impact on prices during 1982. Some industry officials consider the present level of inventory a return to normal, after doubling during the mid-seventies.

Some industry experts state that the current market slump provides an excellent time to initiate new production facilities which will be near completion when the market recovers.

The price of copper is highly dependent upon worldwide economic conditions and as such, it is expected to recover during 1982 and 1983 as the North American economy comes out of the current recession.

1.3 THE BRITISH COLUMBIA COPPER INDUSTRY

The British Columbia copper industry experienced a doubling of gross revenues over the four year period from 1977 to 1980. This dramatic increase in gross revenues can largely be explained by the average price of copper over this period. The British Columbia Ministry of Energy, Mines and Petroleum Resources reports the average price received per pound of copper as follows:

1977	1978	1979	1980
$.63	$.72	$1.09	$1.15

The Mining Association of British Columbia compiles statistics annually on the major copper producers within the province. Table #1 illustrates the average earnings per pound of copper for their combined operations. Thus, it can be observed that while the market price of copper nearly doubled, the net earnings (loss) after taxes and royalties

increased from (2.0¢) in 1977 to 35.1¢ per pound produced in 1980.

TABLE #1

COMBINED STATEMENT OF EARNINGS:

B.C. OPEN-PIT COPPER MINES 1976-1980

	Cents Per Pound of Copper Produced				
	1976	1977	1978 (Note 1)	1979	1980
Pounds of copper produced (millions)	452	520	453	560	541
Gross revenues—Copper sales (Note 2)	64.5¢	60.7¢	75.7¢	109.9¢	120.7¢
Deduct:					
Treatment and refining charges	13.5	15.1	19.8	21.9	27.4
Freight and transportation	3.3	3.5	4.3	4.8	6.7
Other deductions	.4	.4	.9	1.0	1.1
	17.2	19.0	25.0	27.7	35.2
Net revenues—copper sales	47.3	41.7	50.7	82.2	85.5
Add:					
Income from the sale of other metals, expressed in cents per pound of copper. (Note 3)	5.0	7.8	12.3	39.8	44.4
Net mining revenues	52.3	49.5	63.0	122.0	129.9
Operating costs:					
Cost of production and administration	38.8	42.7	46.0	50.2	63.9
Depreciation, depletion and amortization	7.9	6.9	7.9	7.0	9.7
Current exploration	.8	.5	.7	1.6	2.1
Interest on long-term debt	2.2	1.6	1.9	3.6	2.8
	49.7	51.7	56.5	62.4	78.5
Earnings (loss) from mining operations	2.6	(2.2)	6.5	59.6	51.4
Other income less other expenditures	1.8	1.4	.4	.9	4.7
Earnings (loss) before taxes and royalties	4.4	(.8)	6.9	60.5	56.1
Current and deferred taxes and royalties	2.7	1.2	2.9	25.0	21.0
Earnings (loss) after taxes and royalties	1.7¢	(2.0)¢	4.0¢	35.5¢	35.1¢

Notes:

(1) Eight companies were included in 1979 and in 1980 compared with seven in 1978 and prior years. The companies included in the statement for 1979 and 1980 derived 73% of their gross revenues from copper production in both years. Together they accounted for 90% of the Province's net copper revenues in 1980 and 86% in 1979.

(2) For the purpose of this calculation all treatment and refining and freight and transportation charges are added back to net copper revenues to determine the gross revenues. For this reason, and because of the timing of actual shipments during the year, the gross copper price shown received by the companies is not directly comparable to published average copper prices.

(3) Other metals sold by these companies include gold, molybdenum and silver.

Source: The British Columbia Mining Industry in 1980
The Mining Association of British Columbia

SECTION 2

HIGHLAND VALLEY MINING ACTIVITIES

2.1 OVERVIEW

The Highland Valley is located in the south-central section of British Columbia in an area known as the Thompson Plateau, within the Thompson-Nicola Regional District.

In 1899, mineral deposits were discovered in the Highland Valley and, until 1919, small sporadic, high grade mining operations were carried out. The area was dormant from 1919 until 1942, at which time one of the major mining companies in Canada did limited exploration work. In 1954, a syndicate sponsored a prospecting examination of the Highland Valley area and approximately 100 mineral claims were staked. Bethlehem Copper Corporation was incorporated in February 1955.

The results of the exploration programs which were conducted from 1954 to 1960 indicated large deposits of low-grade copper ore. In 1960, Bethlehem Copper secured the financing to bring the property into production and commenced operations in 1962.

2.2 PRESENT OPERATIONS

The copper produced in the Highland Valley accounts for one-third of the copper produced in the province. Currently, the following four mining companies operate in the Highland Valley and provide employment for 2012 persons: Bethlehem Copper, Dekalb Mining Corporation, Highmont Mining Corporation, and Lornex Mining Corporation Ltd. Figure #2 illustrates the location of the major minesites, and a detailed discussion of each is as follows:

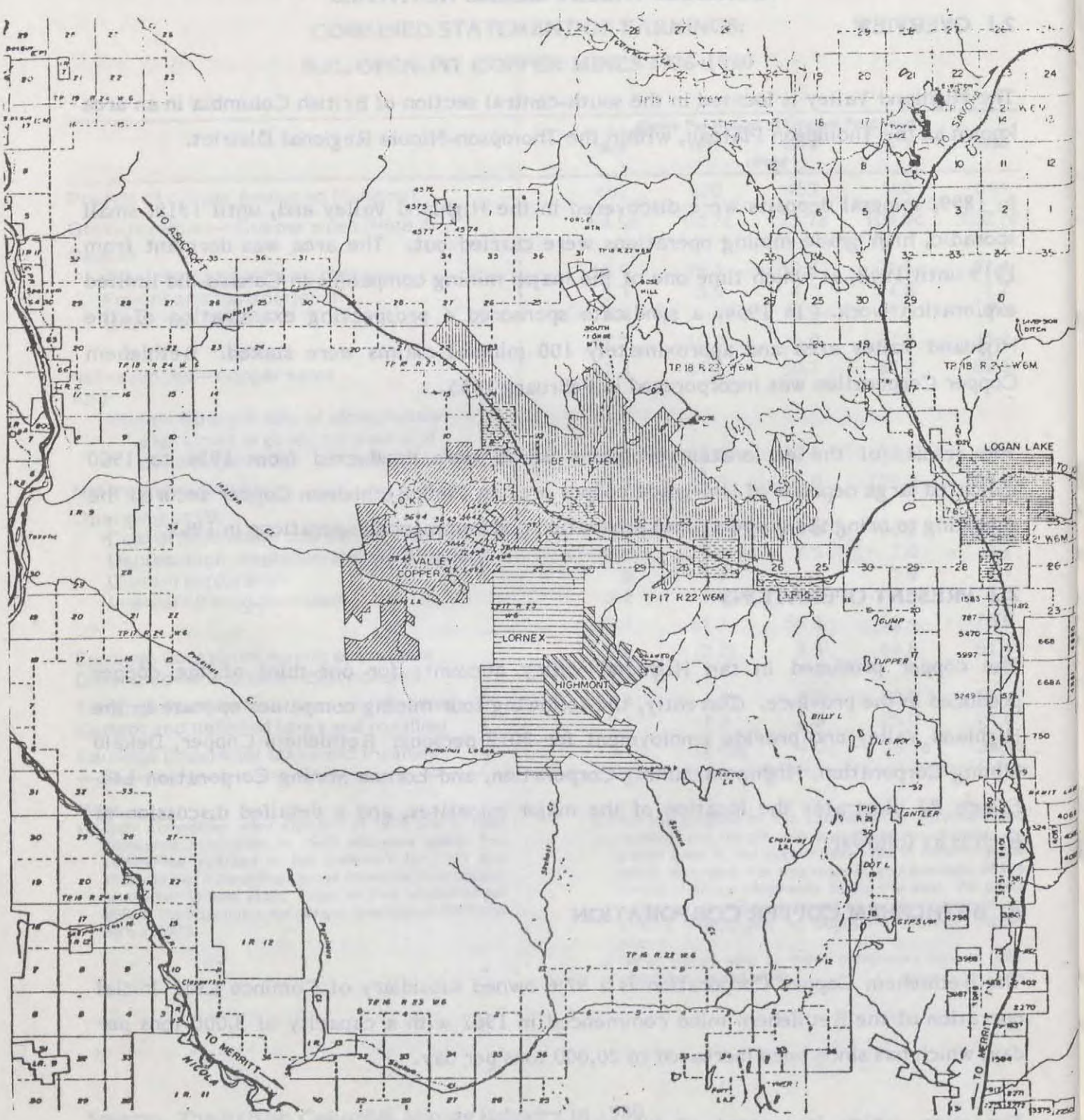
A. BETHLEHEM COPPER CORPORATION

The Bethlehem Copper Corporation is a 97% owned subsidiary of Cominco Ltd. Initial operation of the Bethlehem mine commenced in 1962 with a capacity of 3,000 tons per day, which has since been increased to 20,000 tons per day.

The mine, which is located 19 kilometres west of Logan Lake, produces copper, molybdenum, silver and gold.

FIGURE #2

LOCATION OF MAJOR MINES



Bethlehem Copper currently employs 449 people; 239 in the mine, 158 in the mill and 52 administrative personnel. There is no anticipated change in this level of employment until the orebody is exhausted in 1986/1987 or until Valley Copper commences production. The Valley Copper Stage II Report estimates that a net total of 80 employees will no longer be needed when Bethlehem cuts back production from its own pit in order to mill an additional 27,000 tons of ore from the Valley Copper pit.

Under current economic conditions, the maximum life of the Bethlehem mine is seven years, with the closure anticipated in 1987. However, it is possible that the life of the mine may extend beyond 1987 under favourable economic conditions.

In addition to the existing Bethlehem Copper pit, Bethlehem Copper owns other sizable copper and molybdenum reserves within the Highland Valley, which are presently not economical to develop.

B. DEKALB MINING CORPORATION

The Dekalb underground mine has a milling capacity of 700-800 tons per day, however, the mine is presently operating under "shut-down" conditions. The total employment of this mine peaked at 140 during the first three months of 1981, and was reduced to 110 workers during the summer. 78 of the 110 employees have recently been laid off, with a complete closure anticipated by early 1982. There is presently a small exploration crew on the site, and operations will not resume unless a new deposit is discovered. The current "shut down" plans indicate that only two security guards will remain employed once operations cease.

C. HIGHMONT MINING CORPORATION

The Highmont Mining Corporation was amalgamated with Teck Corporation in 1979, resulting in Teck's current 80% interest in the Highmont mine. Initial operation of the Highmont mine, located 13 kilometres west of Logan Lake, commenced in December of 1980.

The mine produces copper and molybdenum , with a current milling capacity of 25,000 tons per day. The present employment of 415 persons is not anticpated to change in the near future.

The life expectancy of this mine is reported to be a minimum of fourteen years.

D. LORNEX MINING CORPORATION LTD.

The major shareholders of the Lornex Mining Corporation are Rio Algom (68.1%) and Teck Corporation (21.9%). The Lornex mine site, which is located 18 km west of Logan Lake, was brought into operation in October 1972. In 1980, a $160M expansion of the mine and mill operations commenced in concert with the construction of a $6.6M molybdenum plant.

The mine has a current milling capacity of 80,000 tons per day, and produces copper, silver and molybdenum. The current labour force of 1116 persons is anticipated to remain stable into the foreseeable future. Presently, the life expectancy of this mine is reported to be 25 years, as compared to the 21 year life expectancy when the mine commenced production in 1972.

From Table #2, it can be observed that 49% of the 1,980 workers jointly employed by Bethlehem, Highmont and Lornex reside in Logan Lake. The Ashcroft/Cache Creek area is the place of residence for 25%, and Kamloops is the place of residence for 13% of the 1,980 workers.

TABLE #2

DISTRIBUTION OF MINE EMPLOYEES

	Bethlehem		Highmont		Lornex			
	% of Existing Employees	Number	% of Existing Employees	Number	% of Existing Employees	Number	Total	% of Total
Logan Lake	4%	18	55%	228	65%	725	971	49
Kamloops			21%	87	16%	179	266	13
Merritt	6%	27	21%	87	10%	112	226	11
Ashcroft/Cache Creek	90%	404	3%	13	6%	67	484	25
Other			3%	13	3%	33	33	2
Total	100	449	100	415		1116	1980	100

Source: Bethlehem, Highmont and Lornex Mining Corporation

SECTION 3

THE PLANNED OPERATIONS OF VALLEY COPPER MINES LTD.

3.1 THE PROJECT

The largest single milling facility in Canada is being planned by Valley Copper Mines Ltd., a 97% owned subsidiary of Cominco Ltd. Valley Copper is presently seeking the necessary government approvals for the proposed $750 million open pit mine, however, there has been no announcement to date indicating that Valley Copper will proceed with the project. In discussions with senior corporate officials, it has been indicated that the long awaited announcement is pending Board of Directors approval and a financing commitment. If approval and financing are secured by the end of 1981, it is possible that the three year construction period could commence in the spring of 1982.

For purposes of this analysis, it is assumed that the Valley Copper announcement will be made by the end of 1981 and that construction will commence in the spring of 1982. The base data employed in identifying development opportunities resulting from the project will be as reported in the Valley Copper Stage II Report, dated September 30, 1980.

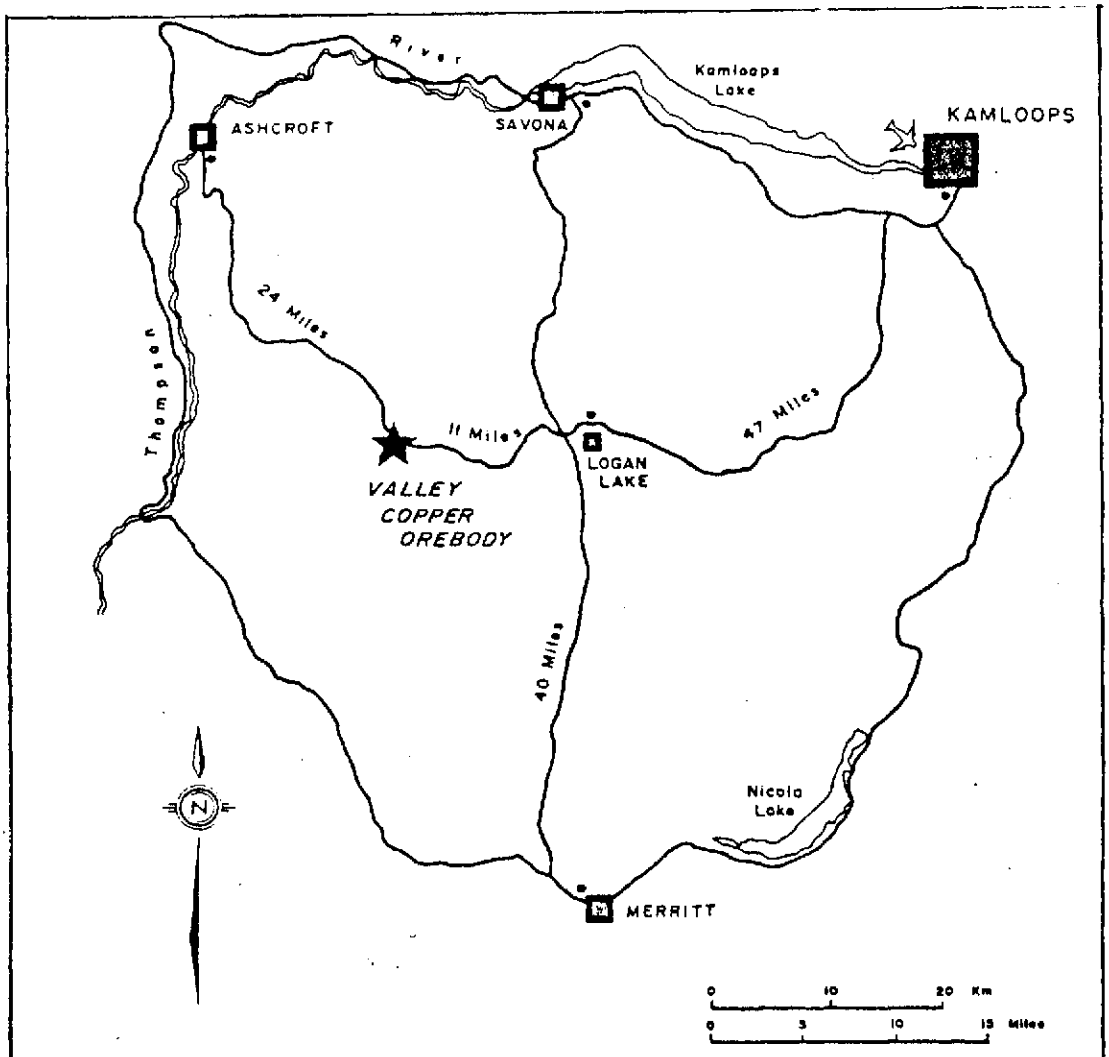
The ore deposit is estimated to contain approximately one billion tons of recoverable reserves which will enable a mine life of 25 years, at the extraction rate of 112,000 tons per day.

The project will be an open pit operation. Ore will be trucked to crushers located within the pit and conveyed to the concentrator complex located northeast of the orebody. The copper concentrate will be conveyed to a storage site for loading onto trucks running between the mine site and Ashcroft, where it will be loaded onto railcars for shipment to the West Coast, and the molybdenum concentrate will be trucked directly to Vancouver.

Valley Copper plans to process 112,000 tons of ore per day, of which 27,000 tons will be processed by Bethlehem Copper and the remaining 85,000 tons will be processed on-site by Valley Copper.

Bethlehem Copper intends to curtail production of the orebody they currently mine by 11,000 tons daily, and the net increase of 16,000 tons will be processed in expanded

FIGURE #3



Place	Distance Miles	Km	Driving Time-Minutes (55 mph)
Logan Lake	11	18	12
Ashcroft	24	39	26
Merritt	51	85	55
Kamloops	58	96	63

Airport Location

Source: Cominco

TRAVEL DISTANCES and DRIVING TIME
to VALLEY COPPER OREBODY

Scale: 1:500,000	Date: APRIL, 1980	Plate:

Thomas Consultants Inc

facilities adjacent to their present plant facilities.

Both mine and mill operations will be on a continuous shift basis, operating 7 days/week, 24 hours/day.

Following approval, the project timing will be as follows:

- First onsite construction work - third quarter following approval.
- Peak construction activity - seventh quarter following approval.
- Project completion - twelfth quarter following approval.
- Full production - fourteenth quarter following approval.

3.2 EMPLOYMENT GENERATION

This section examines the cornerstone of economic development opportunities in the Villages of Ashcroft, Cache Creek, Clinton and Lillooet, resulting from the Valley Copper project.

A. CONSTRUCTION EMPLOYMENT

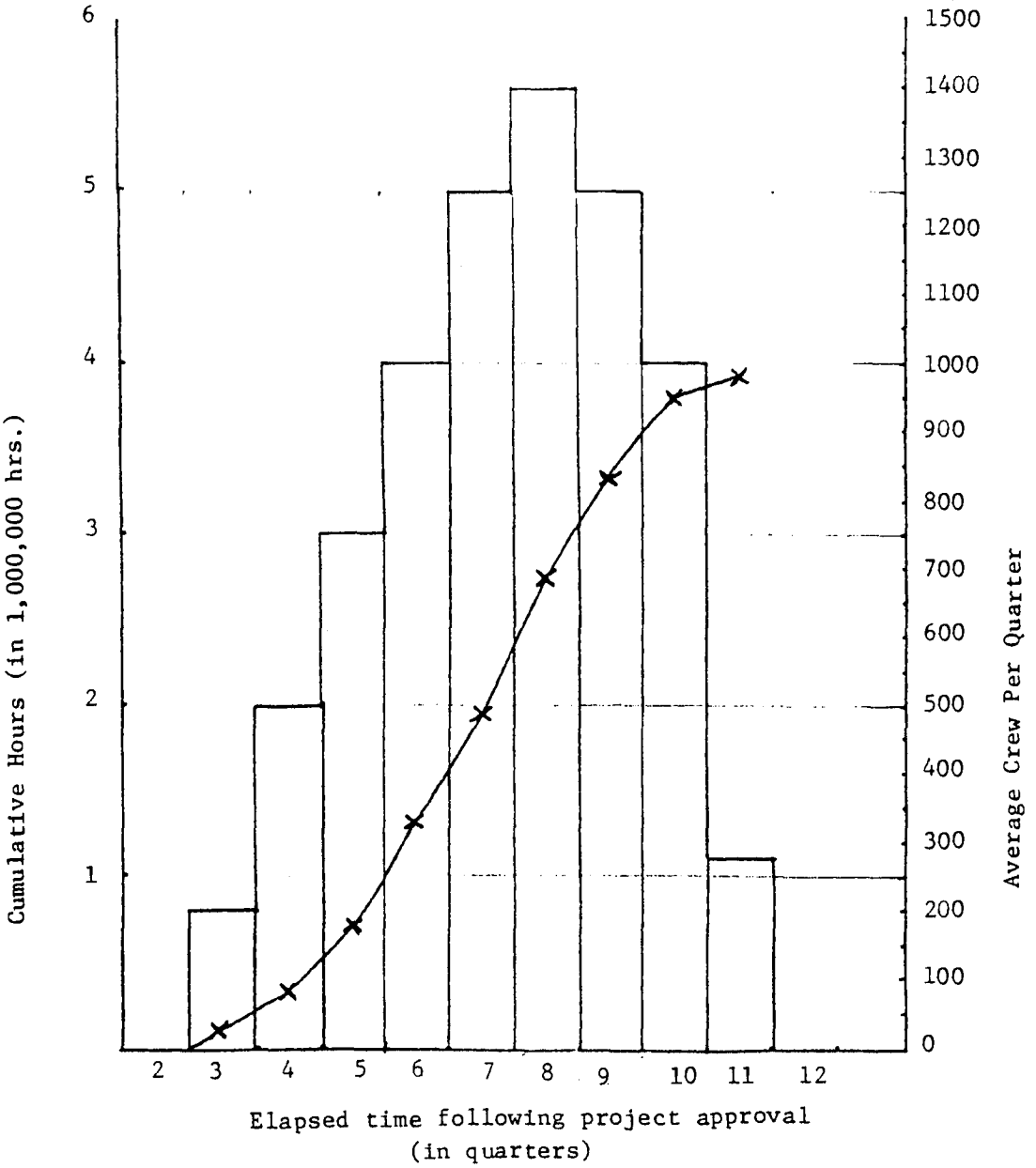
Figure #4 illustrates that the size of construction crew required per quarter during the construction phase peaks at 1,400 in the eighth quarter following approval, and that the cumulative labour requirement totals 3.9 million hours.

The majority of work will be done by labourers, carpenters, operating engineers, ironworkers, pipefitters, and electricians. Based on the experience of Highmont and Lornex, it is anticipated that 80% of the construction workers will come from outside the region. Those from within the region will be workers from Kamloops, who may still choose to live in the camp provided.

The management of Highmont and Lornex, as well as an official of the Canada Employment Centre, report that few construction workers remain as operating employees.

FIGURE #4

CONSTRUCTION WORK CURVE - VALLEY COPPER



Source: Valley Copper

Valley Copper will provide a construction camp on-site, built of prefabricated structures which will be expanded as the work force grows.

In addition to the construction requirements of the Valley Copper mine and mill, an additional crew will be required for the expansion of the Bethlehem mill. This crew will commence work during the third quarter following approval, peak at 460 workers during the fourth and fifth quarters, and finish during the eighth quarter. A construction camp will be provided at the mine site.

As most workers will originate from outside the area, and almost all will reside within the camp, the employment and income spin-offs will be minimal and temporary.

B. PERMANENT DIRECT EMPLOYMENT

Once constructed, the Valley Copper project will provide 846 jobs on the site. Table # 3 illustrates the proposed hiring schedule over the ten quarters following the project approval.

TABLE #3

HIRING SCHEDULE OF VALLEY COPPER DIRECT EMPLOYEES

Date	Increment	Cumulative Total
1st Quarter Following Approval	7	7
2nd Quarter Following Approval	-	7
3rd Quarter Following Approval	-	7
4th Quarter Following Approval	26	33
5th Quarter Following Approval	83	116
6th Quarter Following Approval	27	143
7th Quarter Following Approval	45	188
8th Quarter Following Approval	279	467
9th Quarter Following Approval	257	724
10th Quarter Following Approval	122	846

Source: Valley Copper Project - Stage II Report

The anticipated composition and origin of the total Valley Copper labour force is as illustrated in Table #4.

TABLE #4

ANTICIPATED COMPOSITION AND ORIGIN OF LABOUR FORCE

Type	Local	Outside Region*	Total No.	%
Production Equipment Operators		57	57	7
Maintenance		278	278	32
Truck Drivers	85		85	10
Pit Equipment Operators		125	125	15
Labourers and Other Low Skilled Hourly	111		111	13
Clerical	35		35	4
Technicians		39	39	5
Supervisory		80	80	10
Managerial/Professional		36	36	4
Totals	231	615	846	100

* Includes former Bethlehem employees.

Source: Valley Copper Project - Stage II Report.

The three sources of employees will be as follows:

a) Management estimates that a net total of 80 employees will no longer be needed when Bethlehem cuts back production from its own pit in order to mill an additional 27,000 tons of ore from the Valley pit.

b) It is anticipated that approximately 27% of the total staff requirements, or 231 workers, will be hired from within the area. It is further anticipated that the lower-skilled jobs are the most likely to be filled by local residents. This estimate has been made in conjunction with officials at the Kamloops office of the Canada Employment Centre.

c) It is estimated that 535 staff will have to come from outisde of the region. As indicated in Table #4 , these people will generally take the jobs requiring a higher level of skills. Valley Copper does not anticipate problems in attracting its complement of skilled employees, aside from those skills which are currently in short supply nationwide.

3.3 HOUSING FOR PERMANENT VALLEY COPPER EMPLOYEES

The Valley Copper Project Stage II Report indicates that approximately 75% of the total Valley Copper work force will reside in Logan Lake. The relatively high number of employees anticipated to reside in this community is primarily due to the proximity of Logan Lake (see Figure #3), and housing assistance provided to employees who locate there.

In order to be competitive in the labour market, Valley Copper will provide housing assistance to its employees who choose to reside in Logan Lake. The assistance has not been determined to date, however, the program is expected to be similar to the Highmont and Lornex programs which offer a guaranteed first mortgage interest rate of 13% for one year, a guarantee of 15% during the second year, and a $12,000 interest-free mortgage, forgivable at the rate of 25% per year after the fourth year of employment.

In spite of Logan Lake's obvious comparative advantages, the recent experience in the expansion of the Lornex mine and discussions with senior officials of Valley Copper indicate that it would now appear more likely that approximately 60% of the Valley Copper work force will reside in Logan Lake.

The anticipated distribution of 535 workers attracted from outside the region is illustrated in Table #5.

TABLE #5

		Number
Logan Lake	60%	321
Kamloops	20%	107
Merritt	10%	53
Ashcroft/Cache Creek	10%	54
	100%	535

Source: Discussions with the TNRD and Valley Copper

It is further anticipated that approximately 5% of the total workforce will locate in outlying or rural areas of each respective community, however, classified as a member of the nearest community.

3.4 EFFECTS ON THE POPULATION OF ASHCROFT/CACHE CREEK, CLINTON AND LILLOOET FROM THE VALLEY COPPER PROJECT

As noted in Section 3.3, the population levels of the Villages of Clinton and Lillooet will not be affected by the Valley Copper project.

In determining the total increase in population in the Ashcroft/Cache Creek area, resulting from the direct employment, an average household size of 3.16 persons is assumed based on the 1976 census data. Accordingly, the population growth in the Ashcroft/Cache Creek area solely attributable to the Valley Copper project is projected to be 171 (3.16 x 54) persons by 1985. Of this total, 95%, or 162 will live within the two communities, while 5%, or 9 are anticipated to reside in the surrounding rural areas.

3.5 REGIONAL EMPLOYMENT

In projecting regional employment, the effects of the current and planned mine closures are coupled with the proposed Valley Copper project.

In this section, the effects of the planned closure of the Craigmont mine located north of Merritt will be considered. While this mine is located slightly south of the Highland Valley, it has been indicated that the employees which are laid off at this mine seek employment in the Highland Valley mines, and that the Craigmont mine draws upon many of the same support services.

A brief history of Craigmont Mines Ltd.'s employment pattern is as follows: employment peaked at 500 several years ago, this level gradually decreased to approximately 250 workers and remained relatively stable until 1981, when 200 persons were employed until August. The first major layoff of 50 workers occurred in the fall of 1981, and the workforce is scheduled to be reduced to 45 by May 1982, and zero by the year's end.

A. REGIONAL DIRECT EMPLOYMENT

The direct employment effects of the planned closures of the Bethlehem, Craigmont and Dekalb mines, discussed in the previous section and Section 2.2, coupled with the planned Valley Copper project, provide a measure of net regional employment created in the Highland Valley.

Table #6 illustrates that the net cumulative direct mining employment provided in the region over the period from 1981 to 1987 is an increase of 7 jobs.

TABLE #6
NET REGIONAL DIRECT EMPLOYMENT, 1981-1987
DIRECT JOBS (LOST) OR CREATED

	1981-1982	1983	1984	1985	1986	1987	Total
Dekalb	(140)						(140)
Craigmont	(250)						(250)
Bethlehem				(80)		(369)	(449)
Valley Copper				846			846
Total	(390)			766		(369)	7

B. REGIONAL INDIRECT EMPLOYMENT

Various economic studies concerning the multiplier of indirect jobs resulting from direct employment in the mining industry have indicated that this ratio is in the range of 2.7 to 1.6, however, a close examination of these multipliers reveals that they are determined on a regional, provincial and in some cases, a national basis.

In selecting a multiplier for the mining employment in the Highland Valley, the Valley Copper Stage II Report employs 1.8, while the Thompson-Nicola Regional District Regional and Sub-Regional Profile employs 1.6 as an indirect to direct employment multiplier. It must be stressed, however, that the multipliers of 1.6 and 1.8 are based on regional employment resulting from Highland Valley mining employment. Based on the Valley Copper's anticipated total direct employment of 846, and the indirect

employment multiplier of 1.6, a total of 1,354 indirect jobs will be created in the region as a result of the Valley Copper project.

It is of critical importance to the purpose of this study that the 1,354 indirect jobs resulting from the Valley Copper project represent gross regional indirect employment. This does not take into account the loss of employment resulting from the current and planned mine closures within the region.

Table #7 illustrates the net cumulative regional indirect employment generated from direct mining employment over the period from 1981 to 1987 will be 12 jobs after the closing of the Bethlehem mine scheduled for 1987.

TABLE #7

REGIONAL INDIRECT EMPLOYMENT, 1981-1987

INDIRECT JOBS (LOST) OR CREATED*

	August 1981	1982	1983	1984	1985	1986	1987	Total
Dekalb	(224)							(224)
Craigmont	(400)							(400)
Bethlehem					(128)		(590)	(718)
Valley Copper					1,354			1,354
Total	(624)				1,226		(590	12

Based on the regional indirect to direct employment multiplier of 1.6

It is clearly recognized that while some types of service sector expansion precede project commencement, there are other types which lag behind changes in the level of direct project employment. For the purpose of this analysis, it is assumed that indirect employment will be spread evenly over the period indicated in Table #7. Therefore, the net cumulative effect will be a minimal increase in indirect employment to the year 1987.

3.6 RECONCILIATION OF FINDINGS WITH PREVIOUS STUDIES

It is recognized that the findings of this study conflict with previous findings, however, the prevailing economic conditions at the time of those prior studies can be best described as bouyant and optimistic. With the exception of the Valley Copper project, the expansion plans which predicated these growth scenarios have already occurred, and no additional expansion is anticipated in the near future.

In essence, it is the timing of this report which results in the prediction of little or no population growth resulting from expansions in the mining industry in the foreseeable future.

Thus, the completion of the planned employment expansion by Highmont and Lornex, coupled with the recent depression of the metal markets and high interest rates, provides an entirely different regional economic outlook for this study, as compared to the bouyant economic outlook prevailing during previous studies.

SECTION 4

ECONOMIC DEVELOPMENT OPPORTUNITIES

4.1 COMMERCIAL DEVELOPMENT OPPORTUNITIES

On the basis of the foregoing discussion, it is concluded that service oriented commercial development opportunities resulting from the Highland Valley mining projects will be minimal and not readily identifiable.

Given that the demand for retail and service commercial facilities normally follows population increases, the new 13,000 sq.ft. shopping centre and the 50 room hotel in the Village of Ashcroft would be in response to the population growth already experienced as a result of expansions in the mining industry.

A. TOURISM

Of the three major mines presently operating in the Highland Valley, Bethlehem and Lornex presently conduct public tours, and Highmont indicates that it may consider a tour program once its operations are more streamlined.

Lornex has been conducting tours twice daily from June 1 to September 30 since 1972. The tours run five days per week with a capacity of 15 persons per tour. While no visitation statistics are available, discussions with a Lornex official indicate that the tours are usually full and there has been an increasing number of people arriving for tours, some of which are unable to be accommodated. In general, it is believed that many of the tour participants are in the area for fishing, and others have been attracted by the upgraded road through the Highland Valley.

Bethlehem Copper has been conducting tours on a year-round basis since the mine opened in 1961. The 40 minute tours are conducted twice daily, 5 days per week, with a capacity of 12 persons. Discussions with a representative of Bethlehem Copper indicate that the average tour size during the summer is approximately 4 to 6. However, group tours are available by special arrangement 7 days per week. The group tours usually consist of schools, clubs, scouts or bus tours, and can accommodate up to 60 persons. It has been indicated that tour interest is relatively static, however, the Lornex sign is

more prominent when driving past the mines.

The Valley Copper Stage II Report has not addressesd a potential tour program to date. However, discussions with a senior official indicate that Valley Copper will probably follow the general practice of other mines in the area. In addition, Valley Copper indicates an interest in providing prearranged tours to educational groups.

While there is presently no evidence that the Valley Copper tours will increase the number of tourist nights, it would appear that the potential to offer tours of the world's largest copper mine, combined with tours of British Columbia's first thermal power generating plant (the Hat Creek project), could attract more one night stopovers in the study area.

4.2 INDUSTRIAL DEVELOPMENT OPPORTUNITIES

While the exact purchasing and servicing patterns of the mining industry have been the subject of extensive study, the results to date have been rather inconclusive. Notwithstanding, an analysis of purchasing and servicing patterns of mine-related equipment reveals that the vast majority of the Highland Valley's industrial requirements are currently being met by the facilities located in Vancouver and Kamloops. Discussions with purchasing agents and mine managers have indicated that, in most cases, Vancouver is the primary supplier of purchases, and Kamloops is the secondary supplier. The underlying reason cited for this massive outflow of purchasing dollars to major centres is the nature of items purchased. Specifically, the vast majority of the purchasing dollars are spent on specialized mining equipment which is acquired directly from a factory outlet or manufacturers representative, usually located in the Lower Mainland or Kamloops. The purchase of small items is reported to represent an extremely small component, or an approximate 5% to 10% of total purchases.

The relative distances of Vancouver and Kamloops from the mine sites does not cause any undue delays in the present purchasing or service requirements of the existing mines. The industrial facilities located in Vancouver are only an overnight haul from any of the mines, and Kamloops is only slightly in excess of an hour away from the major mines.

Detailed discussions with the mine managers and purchasing agents located in the Highland Valley indicate that the transportation service to and from Vancouver and Kamloops is excellent. Deliveries from Vancouver are often made via the freight trucks which transport molybdenum to Vancouver, and deliveries from Kamloops are often made by employees who commute from Kamloops with company vehicles, or by regular freight service.

A. PURCHASING AND SERVICING OF MAJOR EQUIPMENT

Based on the foregoing discussion of transportation facilities, it is evident that the purchasing and servicing requirements related to major pieces of mining equipment can be conveniently provided by the two regional centres of Vancouver and Kamloops. If a new facility were to locate in the Ashcroft/Cache Creek area, it would be forced to compete directly with the existing outlets located in Vancouver and Kamloops.

Discussions with representatives of Finning Tractor indicate that Finning currently captures up to 50% of the total Highland Valley market for mining equipment. In order to service this substantial share of the market, Finning currently has one service representative who works the Highland Valley exclusively, and three parts and service attendants, and one sales representative who work in the Highland Valley, all of whom are based in the Kamloops branch.

Finning has recently obtained the approval of the Thompson-Nicola Regional District to set up a satellite operation in the Highland Valley. This approval has been pursued in the event that the Valley Copper project goes ahead, and Finning wishes to locate an operation closer to the mines. However, there has been no commitment from Valley Copper yet, and Finning has not committed itself to this operation even if Valley Copper proceeds as planned. If Finning were to commence this potential operation, it would most likely be six months to one year following the Valley Copper's commencement of mining operations, employing six to twelve workers.

Discussions with a representative of H.A. Simons International Ltd. provided the following explanation for limited industrial development opportunities in the mining industry.

> As the mines in the Highland Valley become more sophisticated, specifically the Valley Copper project, the latest technology will be employed. The result

is higher productivity per unit, and increased automation, which requires more servicing. However, it is most likely that new mines will sign service contracts with the distributor or manufacturer's representative when purchasing new equipment. Under such a contract, when equipment breaks down or requires special servicing, the mine is typically able to call the distributor or manufacturer, who sends a representative to remove and replace the faulty component, which is returned to the factory for repair. Thus, it is pointed out that while automation decreases direct employment and increases indirect employment, it would largely be indirect employment generated by an existing firm, in a major centre.

TIRES

Crown Tire of the Lower Mainland has been cited as a major supplier of tires to the Highland Valley. Discussions with Crown Tire indicate that it provides "next-day" delivery to mines located in the Highland Valley. Crown Tire does not have any expansion plans at the present time and indicates that Highland Valley customers seem very satisfied with the present service. Crown Tire does not employ any service representatives in the Highland Valley, the tires are simply shipped to the minesites.

Skega Rubber is presently constructing a manufacturing plant in Kamloops. This plant will be operational by the end of 1981, commencing with 8 to 10 employees. In the site selection, Skega Rubber was seeking a location in Western Canada to complement its current operations in North Bay, Ontario and Sweden.

STEEL GRINDING BALLS

The feasibility of manufacturing steel grinding balls in British Columbia is currently under review by Don Ference and Associates Ltd., Management Consultants. This study is not yet complete, however, discussions with a representative of Norcast, a division of Noranda, indicate that this company recently ceased operation of its Ocean Foundary in Surrey, B.C., which produced "slug" shaped steel grinding balls.

Norcast has had an option on some land in Savona for several years, however, they have recently let this option lapse because it is not economically feasible for Norcast to produce steel grinding balls in B.C. Norcast indicates that the production of steel

grinding balls requires the production or purchase of steel rods which are further processed into grinding balls. This input requirement dictates that a producer of steel grinding balls must operate its own steel mill to produce the rods, or alternatively, acquire them in the marketplace.

B. MINOR ITEMS AND REPAIRS

Discussions with mine managers and purchasing agents further indicated a policy of attempting to do business locally, whenever possible. Specific reference was made to the Cache Creek Machine Shop which provides excellent service and workmanship in equipment repair to the mines located in the Highland Valley, and the bulk oil facilities located in Ashcroft.

It has been indicated that minor items, such as hardware and chemicals which are used extensively by the copper mines, are reasonably well supplied from Kamloops. While the number of outlets located within the region is currently adequate to meet the aggregate demand, it has been indicated that the mining companies would welcome competition from more local suppliers.

C. TRANSPORTATION

Discussions with the Ashcroft branch of Arrow Transportation Systems Inc. indicate that, if Arrow was awarded the contract for hauling the concentrate from the Valley Copper mine to Ashcroft, their staff requirements would increase from the current level of eleven to twenty-one employees.

Transportation of the molybdenum from the Valley Copper mine to Vancouver would not generate any additional local employment for Arrow, as the Highland Valley to Vancouver haul is handled by the Vancouver office of Arrow Transfer.

Trimac Transportation System currently employs six residents of Ashcroft. Trimac holds the contract for the transportation of the concentrate from the Bethlehem and Highmont mines, and held the former Dekalb contract. If awarded the Valley Copper contract, Trimac would require up to three additional trucks stationed in Ashcroft.

The Ministry of Highways could not provide an estimated completion date of the Coquihalla Highway extending from Hope to Kamloops. However, it has been indicated that this route, which is presently under construction, will most likely become the preferred route for trucks hauling molybdenum from the mines in the Highland Valley to the coast. Due to the fact that the completion date of this project is so uncertain, the trucking firms contacted were unable to indicate whether those trucking facilities presently located in the Ashcroft/Cache Creek area will be relocated along the route of this new highway.

Discussions with both the CNR and CPR indicate that both firms are competing for the Valley Copper contract, and that the handling of the concentrate from the Valley Copper mine would not require any additional employees.

D. THE POTENTIAL FOR COPPER SMELTER

It has been speculated that the expansion of the Highland Valley mining operations and specifically, the Valley Copper project, would be accompanied by the development of a copper smelter near the mines in the Highland Valley. Industry experts agree that the Highland Valley would be the most feasible location for an additional copper smelter within the province, however, no plans have been announced to date.

It has been further speculated that Cominco would be the most likely to develop such a smelter due to the scale of its commitment to the Highland Valley, and its general operating patterns. However, discussions with senior personnel of Valley Copper and Bethlehem Copper indicate that it is possible to place concentrate in Eastern Canadian or "offshore" smelters at competitive rates. Therefore, it is not economically feasible to construct one at the present time.

SUMMARY OF INDUSTRIAL DEVELOPMENT OPPORTUNITIES

While the Highland Valley mine managers and purchasing agents indicated an increasing demand for local repair facilities and suppliers of minor items, and a desire to do business locally, provided that the product, price and service is competitive with those of major service centres, it would appear that there are not any obvious industrial development opportunities in the Ashcroft/Cache Creek area resulting from the Valley Copper project.

4.3 REGIONAL INDUSTRIAL DEVELOPMENT

Kamloops' strategic location at the centre of the Thompson-Nicola Regional District has enabled it to become established as a regional trade, service and manufacturing centre. As well as being the major commercial service centre for the mining activities in the Highland Valley, Kamloops is also the administrative centre for provincial forests within the region.

Kamloops' prominence as a regional centre with a diversified economy will result in its continued attractiveness to mining related operations. Accordingly, Kamloops is actively promoting its plentiful supply of serviced industrial land. The availability of land, coupled with a good supply of local labour, makes Kamloops an excellent prospective location of the establishment of secondary manufacturing related to the mining activities in the Highland Valley.

Appendix I provides a list of locational factors considered by firms seeking a site and provides a yardstick with which to measure the relative advantages and disadvantages of locating secondary manufacturing facilities in the Ashcroft/Cache Creek area.

APPENDIX I

LOCATION FACTORS CONSIDERED BY FIRMS

A. Transportation
   1. General availability of rail, truck, air or water transportation
   2. Availability of scheduled service
   3. Cost of inbound shipments of raw materials
   4. Shipping costs of final products to markets
   5. Warehousing facilities, capacity, and costs
   6. Quality of service
      a) highway road conditions
      b) frequency of service
      c) losses through handling
      d) rail line quality

B. Labour
   1. Supply of labour
      a) total labour force within commuting distances
      b) skill composition of work force
      c) male/female supply
   2. Facilities for training, education
   3. Wage rates, fringe benefits
   4. Degree of unionization
   5. Seasonal fluctuations, migratory trends
   6. Reputation for dependability, productivity

C. Marketing
   1. Economic relation to market or main market centre
   2. Population of trading area - urban-rural mix
   3. Income levels
   4. Availability of other firms as outlets for production
   5. Location of competitors

D. Site Cost
   1. Land value
   2. Building costs
   3. Space for expansion

E. Raw Materials
   1. What available
   2. Assembling costs
   3. Quality
   4. Reserves
   5. Disposal of raw material by-products

F. Power and Fuels
   1. Availability of electric power, coal, gas, oil, etc.
   2. Power and fuel costs
   3. Disposal of fuel by-products

G. Financial
   1. Availability of local capital
   2. Adequacy of banking facilities

H. Water
   1. Availability of adequate supply of proper quality water
   2. Costs of water

I. Community Influences
   1. Housing
   2. Local attitudes
   3. Physical attractiveness
   4. Recreation facilities
   5. Fire protection and insurance
   6. Social structure
   7. Universities, research and education facilities

J. Government Policy
    1. Tax structure
    2. Incentives to new firms

Source: The Thompson-Nicola Regional District

ADDENDUM

Since the time of writing the Highland Valley Economic Development Opportunity Analysis, Valley Copper has announced the postponement of its Board of Directors meeting, and thus a decision on Valley Copper, until early 1982.

In discussions with senior personnel of Valley Copper regarding this delay, it has been indicated that the project is still very much "on track" and that a project announcement is anticipated in early 1982.

In response to the suggestion that the Valley Copper project decision hinges on a certain copper price being attained, senior officials indicate that the Valley Copper feasibility studies have been completed for some time and that spot copper prices are not a major determining factor. However, in the mining industry in general, the standard industry requirement of $1.50 per pound of copper in order to justify new mine development has risen to between $1.50 and $2.50 per pound, depending on the location, type and size of the deposit.

PART II
HAT CREEK THERMAL POWER PROJECT OPPORTUNITY ANALYSIS

SECTION 1

PROJECT BACKGROUND

1.1 OVERVIEW

In 1960, the former B.C. Electric Company acquired title to the coal property which is located in the Highland Valley in south-central British Columbia (see Figure #1). During the early 1960's, exploration work and studies were conducted to determine the feasibility of a coal-fired power plant utilizing this deposit.

Subsequent to the takeover of the B.C. Electric Company by British Columbia Hydro and Power Authority (hereinafter referred to as B.C. Hydro) a study conducted in 1974/1975 by a B.C. Hydro task force recommended that the first unit of a 2,000 megawatt (MW) power plant be constructed at Hat Creek in 1983, following completion of the hydroelectric project at Revelstoke. At that time, the proposed sequence for installation of new generating projects was: the Revelstoke Hydroelectric project, the Hat Creek Thermal project, followed by the Site C Hydroelectric project.

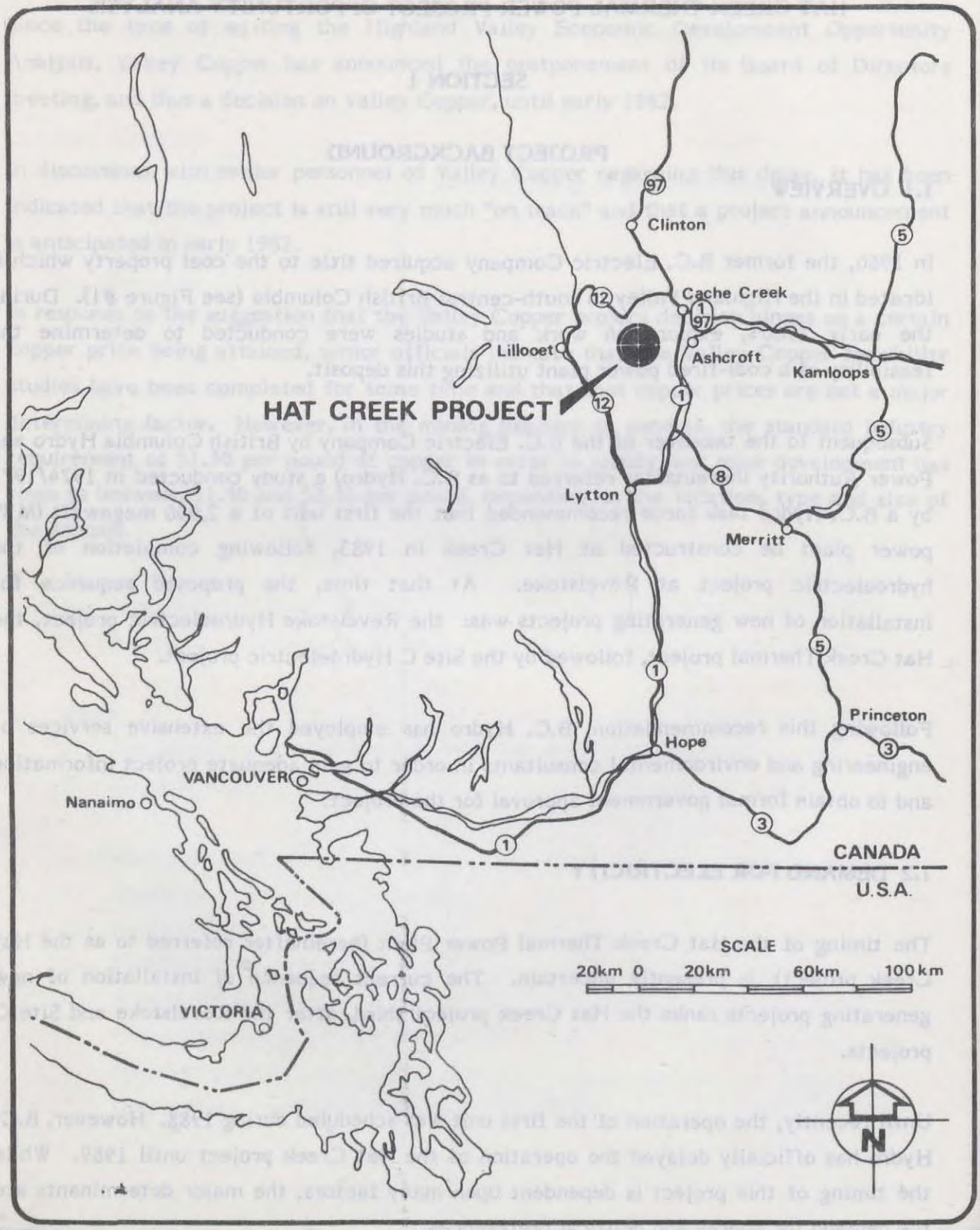
Following this recommendation, B.C. Hydro has employed the extensive services of engineering and environmental consultants in order to gain adequate project information and to obtain formal government approval for the project.

1.2 DEMAND FOR ELECTRICITY

The timing of the Hat Creek Thermal Power Plant (hereinafter referred to as the Hat Creek project), is presently uncertain. The current sequence of installation of new generating projects ranks the Hat Creek project third, after the Revelstoke and Site C projects.

Until recently, the operation of the first unit was scheduled during 1988. However, B.C. Hydro has officially delayed the operation of the Hat Creek project until 1989. While the timing of this project is dependent upon many factors, the major determinants are the demand for energy and political preferences.

FIGURE #1


Clinton
Cache Creek
Lillooet
Ashcroft
Kamloops
HAT CREEK PROJECT
Lytton
Merritt
Princeton
Hope
VANCOUVER
Nanaimo
VICTORIA
CANADA
U.S.A.
SCALE
20km 0 20km 60km 100 km
N

Each year, B.C. Hydro reviews and revises the electrical demand projections for the decade ahead. B.C. Hydro's load forecast indicated in Energy Blueprint 1981 indicates that the demand for electricity in B.C. will increase at an average rate of 6.1% per annum to March 31, 1991, as illustrated in Figure #2. However, more recent forecasts, made public relating to the Site C hearings, indicate that the average annual demand for electricity will increase by 5.7% over the next ten years.

In view of the lower load growth rate predicted in the most recent load forecast, B.C. Hydro's Board of Directors has decided to defer until 1982 the request for permission from the B.C. Utilities Commission to construct the project.

However, Hydro Chairman, Robert Bonner, recently stated that "There is no doubt that the Hat Creek Thermal Power Plant will be required to meet B.C.'s energy demands in ten years". Discussions with the Ministry of Energy, Mines and Petroleum Resources indicate slightly more conservative load requirements and that the Hat Creek project will be required by the early 1990's.

Originally, the first 500 MW generator was scheduled to be operational by 1988, with one generator installed during each of the following three consecutive years. During B.C. Hydro's recent revision of load requirements, this schedule has been amended to include the operation of the first generator during 1989, the second during 1990 and the third and fourth generators operational during 1993 and 1994, respectively.

1.3 SUPPLY OF ELECTRICITY

B.C. Hydro is presently studying several projects in order to meet forecast demands. Table #1 illustrates the earliest feasible in-service dates of major generation projects that B.C. Hydro is considering for future construction, and Figure #2 illustrates the economic ranking of each potential project.

TABLE #1

MAJOR GENERATION PROJECTS

	Project	Earliest In-Service Date	Nominal Generation Capacity (MW)
Hydro:	Peace Site C	October 1987	900
	Murphy Creek	October 1989	400
	Iskut Sites	October 1990	935
	Stikine Sites	October 1992	1,830
	Liard Sites	October 1993	4,760
Thermal:	Hat Creek	August 1988	2,000
	East Kootenay	October 1989	600

Source: B.C. Hydro Energy Blueprint, 1981

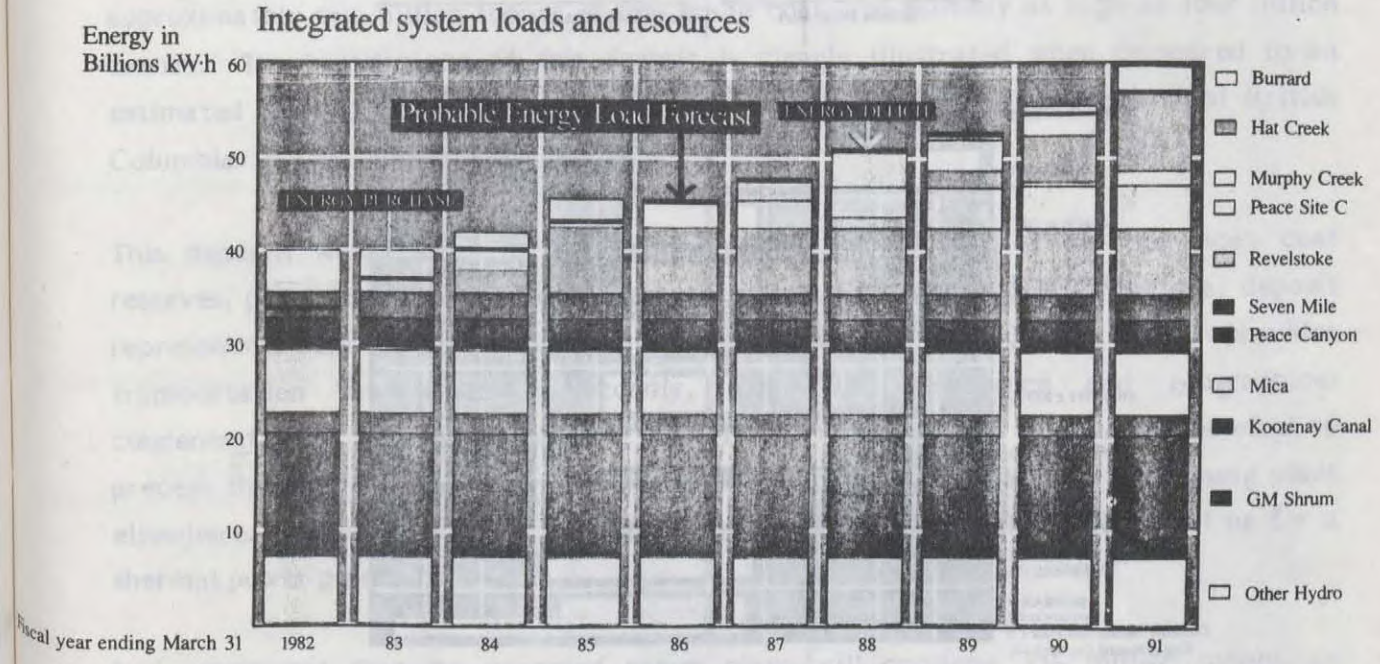
More specifically, Table #1 indicates that Site C would be in service by October 1987. However, based on the recent delay of the public hearings, it appears that late 1987 or early 1988 would be the earliest possible in-service date for that project.

As indicated earlier, the delay in the application for permission to construct the Hat Creek project has postponed the earliest in-service date of this project until 1989.

Provided that the current generation sequence is maintained, current load forecasts indicate that any further delays in the licencing of the Site C and Hat Creek projects would create a shortage in the future energy supply.

Accordingly, for the purposes of this analysis, it is assumed that the first unit of the Hat Creek project will be operational by 1989.

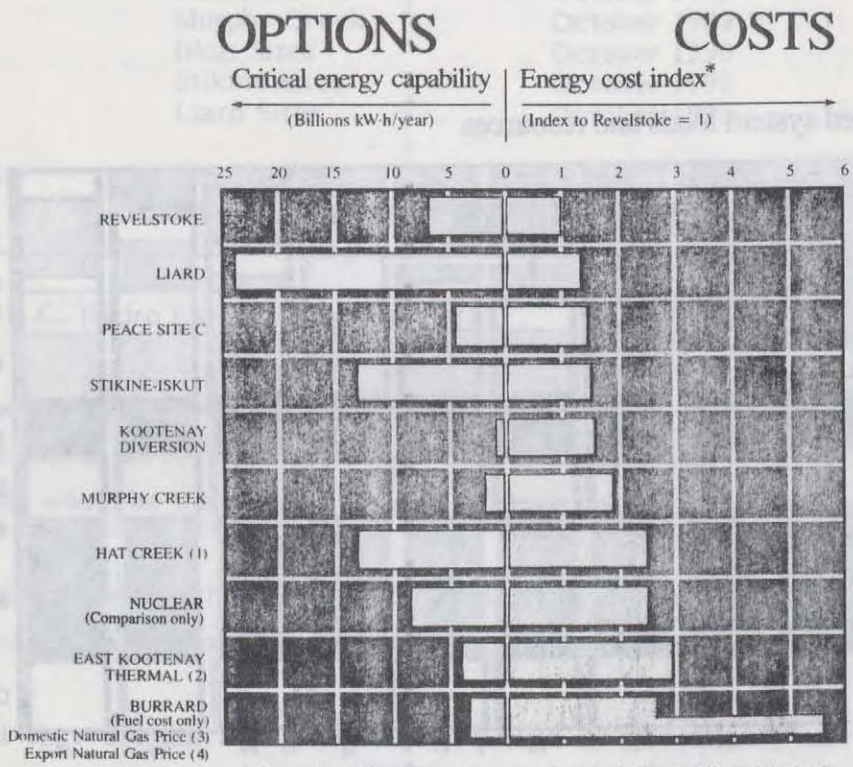
FIGURE #2



Note: All hydroelectric plant energy capability based on critical water conditions.

At March 31, 1981

FIGURE #3



At March 31, 1981

1. Cost based on design with wet flue gas desulphurization (0.27 mg/kJ SO_2 Emission level).
2. Cost based on design with Meteorological Control System (MCS) without flue gas desulphurization.
3. Cost based on estimated (Nov. 1980) domestic price for natural gas.
4. Cost based on current export price for natural gas.

* **NOTE: All energy costs are compared with energy cost for the Revelstoke Project (4 units) on the Columbia River (i.e. Revelstoke has an energy cost index of 1.0).**

1.4 THE HAT CREEK VALLEY DEPOSIT

The Hat Creek Valley contains two major deposits of low grade coal. The Number One deposit is located near the north end of the Valley, and it is the deposit proposed for development by B.C. Hydro. Deposit Number Two is larger and located to the south of Deposit Number One, between Anderson Creek and White Rock Creek, as illustrated in Figure #4.

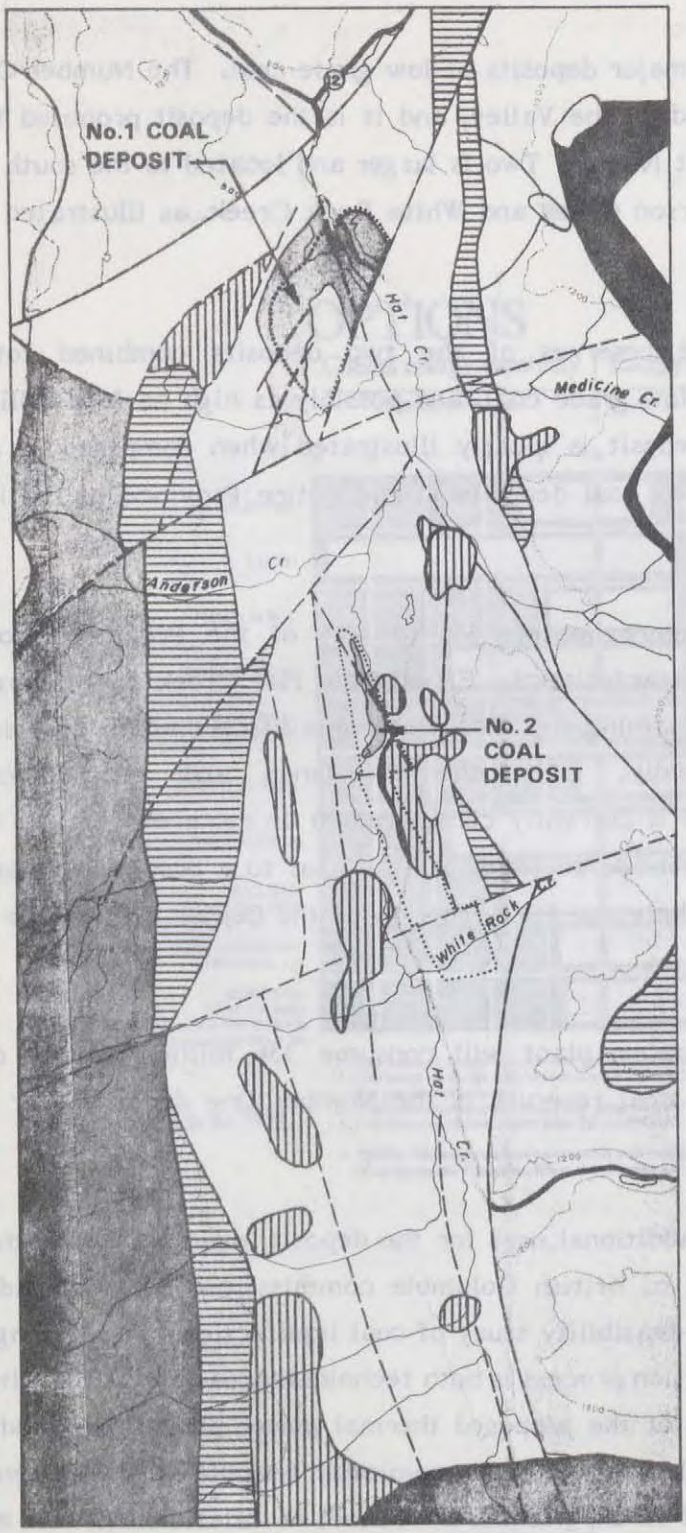
Industry experts indicate that the reserves of the two deposits combined total approximately two billion tonnes of low grade coal, and possibly as high as four billion tonnes. The significance of this deposit is clearly illustrated when compared to an estimated thirty-five billion tonnes of coal deposits in the entire Province of British Columbia.

This deposit, which accounts for approximately 6% to 11% of the Province's coal reserves, possesses two particular characteristics. Firstly, the Hat Creek coal deposit represents a very low grade coal containing significant amounts of clay which provides transportation difficulties. Secondly, given the abundance and geographical concentration of this coal deposit, it is currently considered to be more economical to process the coal "on-site" than to attempt to transport the coal to a processing plant elsewhere. Accordingly, the most likely use for a portion of the deposit will be for a thermal power plant.

It is estimated that the proposed power plant will consume 336 million tonnes, or approximately one half of the known coal reserves in the Number One deposit, over a thirty-five year operating period.

B.C. Hydro is presently considering additional uses for the deposit, over and above the proposed power plant. The Province of British Columbia commissioned Fluor Canada Ltd. to undertake an engineering pre-feasibility study of coal liquifaction. The findings of this study indicate that the liquifaction process is both technically feasible at this site and compatible with the parallel use of the proposed thermal power plant. The study further indicates that a liquifaction plant would be economically feasible at the current price of oil, provided that the price of oil experiences a real (net of inflation) increase of 2% per annum in the future.

GEOLOGICAL MAP



LEGEND

TERTIARY
MIOCENE
- OLIVINE BASALT

MIOCENE OR EOCENE
- LAHAR

EOCENE

CENOZOIC
- KAMLOOPS GROUP: MEDICINE CREEK FORMATION: SILTSTONE, CLAYSTONE
- HAT CREEK COAL FORMATION: COAL
- COLDWATER BEDS: SANDSTONE, SILTSTONE, CONGLOMERATE, MINOR SHALE AND CLAYSTONE
- DACITE, VESICULAR BASALT RHYOLITE, ANDESITE

CRETACEOUS AND LATER

MESOZOIC
- UNDIFFERENTIATED VOLCANIC ROCKS

CRETACEOUS
- SPENCES BRIDGE GROUP: ANDESITE, RHYOLITE, BASALT, DACITE
- MOUNT MARTLEY STOCK: GRANODIORITE

PERMIAN AND EARLIER

PALEOZOIC
- CACHE CREEK GROUP: MARBLE CANYON FORMATION: LIMESTONE
- GREENSTONE

- GEOLOGIC CONTACTS (APPROXIMATE)
- FAULTS AND LINEAMENTS (TOPOGRAPHIC AND GEOPHYSICAL)
- ROADS
- OUTLINE OF DEPOSIT

1km 0km 1km 2km 3km

CONTOUR INTERVAL — 300 METRES

N

Thomas Consultants Inc

SOURCE: British Columbia Hydro and Power Authority

The foregoing discussion clearly indicates the relative volume of the Hat Creek coal deposit. Representing the largest concentration of low grade coal in the world, this reserve is of vital importance to Canada's future. Industry experts are certain that there will be a power plant and coal conversion in the Hat Creek Valley at some future date. The future Canadian and global supply and demand for energy will determine those dates. Energy Update, April 1981, states "Now that the 'cheap oil' era has ended, coal is receiving increased worldwide attention as an alternative to oil".

SECTION 2

THE HAT CREEK PROJECT

2.1 THE PROJECT

The proposed 2,000 MW Hat Creek thermal generation plant would include a mine and power plant located in the upper Hat Creek area, and various offsite facilities in the surrounding region. The project process can be most simply described as follows:

ELECTRICITY GENERATION PROCESS

Open pit coal mining from deposit

↓

Blending the coal to an average quality

↓

Conveying it to the power plant located on high ground approximately 4km northeast of the mine

↓

Burning the coal to produce steam

↓

Use the steam to turn turbines which power generators producing electricity for the provincial power grid

---

Source: Hat Creek Environmental Impact Statement, April 1981.

While it has been indicated that the 1978 Detailed Environmental Studies are outdated, they currently represent the only complete data available. In the absence of more current data from B.C. Hydro, the following section provides an analysis of the socioeconomic impacts of the project as stated in the Detailed Environmental Studies, Impacts, Mitigation, Compensation and Enhancement - Volume II-November 1978.

2.2 PRE-CONSTRUCTION PHASE - DIRECT AND INDIRECT EMPLOYMENT

As indicated in the Detailed Environmental Studies, the impacts are assessed for the Pre-Construction, Construction and Operating, and Decommissioning phases of the project. The majority of the identifiable impacts occur during the Construction and Operating phases.

The existence of transient consultants, mining technologists, and B.C. Hydro personnel was identified in the 1978 study as the main impact on the study area during the pre-construction phase. This transient component of the labour force has, in fact, provided an increase in the demand for local commercial facilities such as food and lodging. In addition, a few local residents have been provided with temporary employment and various contracting jobs for B.C. Hydro. However, there has been little, if any, permanent change in the study area resulting from the pre-construction phase of the project.

TABLE #2

DIRECT EMPLOYMENT FOR TOTAL HAT CREEK PROJECT
CONSTRUCTION AND OPERATING PHASES
FOR YEARS (1978-1990) AND 2000,2010, 2020

	Construction				Operating			
	Thermal Plant	Mine	Offsites	Total	Thermal Plant	Mine	Total	Project Total
1978	75	-	160	235	1	-	1	236
1979	232	123	285	640	1	-	1	641
1980	545	260	131	936	1	136	1	1,073
1981	1,299	258	509	2,066	3	141	144	2,210
1982	2,102	712	100	2,914	54	179	233	3,147
1983	2,200	740	10	2,950	156	203	359	3,309
1984	1,662	618	10	2,290	169	276	445	2,735
1985	990	618	10	1,618	237	347	584	2,202
1986	295	618	10	923	247	394	641	1,564
1987	-	618	20	628	247	580	817	1,445
1988	-	331	-	331	247	591	838	1,169
1989	-	331	-	331	247	607	854	1,185
1990	-	331	-	331	247	616	863	1,194
2000	-	244	-	224	247	696	943	1,167
2010	-	75	-	75	247	850	1,097	1,172
2020	-	-	-	-	247	905	1,152	1,152

Source: B.C. Hydro & Power Authority, Thermal Division
Personal communication, August 25, 1977, as illustrated in the Detailed Environmental Studies

2.3 CONSTRUCTION AND OPERATING PHASES - DIRECT EMPLOYMENT

It is the construction and operating phases of the Hat Creek project which will create substantial direct and indirect employment opportunities within the study area.

As indicated in Table #2 the construction activities were scheduled to commence during 1978 and to peak in 1983 with 2,950 workers.

As further indicated in Table #2, operating employees will peak at 1,152 during 2020. The thermal plant employees will be phased into operation with each of the four successful generating units, and will then become constant at 247. The mine employees will increase constantly over the life of the project, peaking at 905 in the year 2020. Both the mine and the thermal plant will operate on three shifts, seven days per week.

The airport is the only off-site facility expected to have a permanent workforce.

2.4 REGIONAL LABOUR FORCE PARTICIPATION IN THE HAT CREEK PROJECT

While it is anticipated that there will be some opportunities for local and regional participation, the level will be dependent upon the level of unemployment among unionized tradesmen within the Province, the local supply of skilled tradesmen, and the union dispatch procedures at the time of construction.

B.C. Hydro's preliminary definition of the Hat Creek region states that the region is bounded on the north by an east-west line through 100 Mile House, on the south by an east-west line drawn through a point 8 miles south of Lytton, on the west by a north-south line through the west end of Seton Lake, and on the east by a north-south line through the eastern boundary of Kamloops.

In addition, a second area has been defined as a subset of the region within which the majority of the potential land use and population induced project impacts will occur. This area is bounded by 70 Mile House to the north, Lillooet to the west, and east-west line 20 miles south of Ashcroft in the south and Walhachin in the east, and is termed the local area, as illustrated in Figure #5.

FIGURE #5

LOCAL STUDY AREA

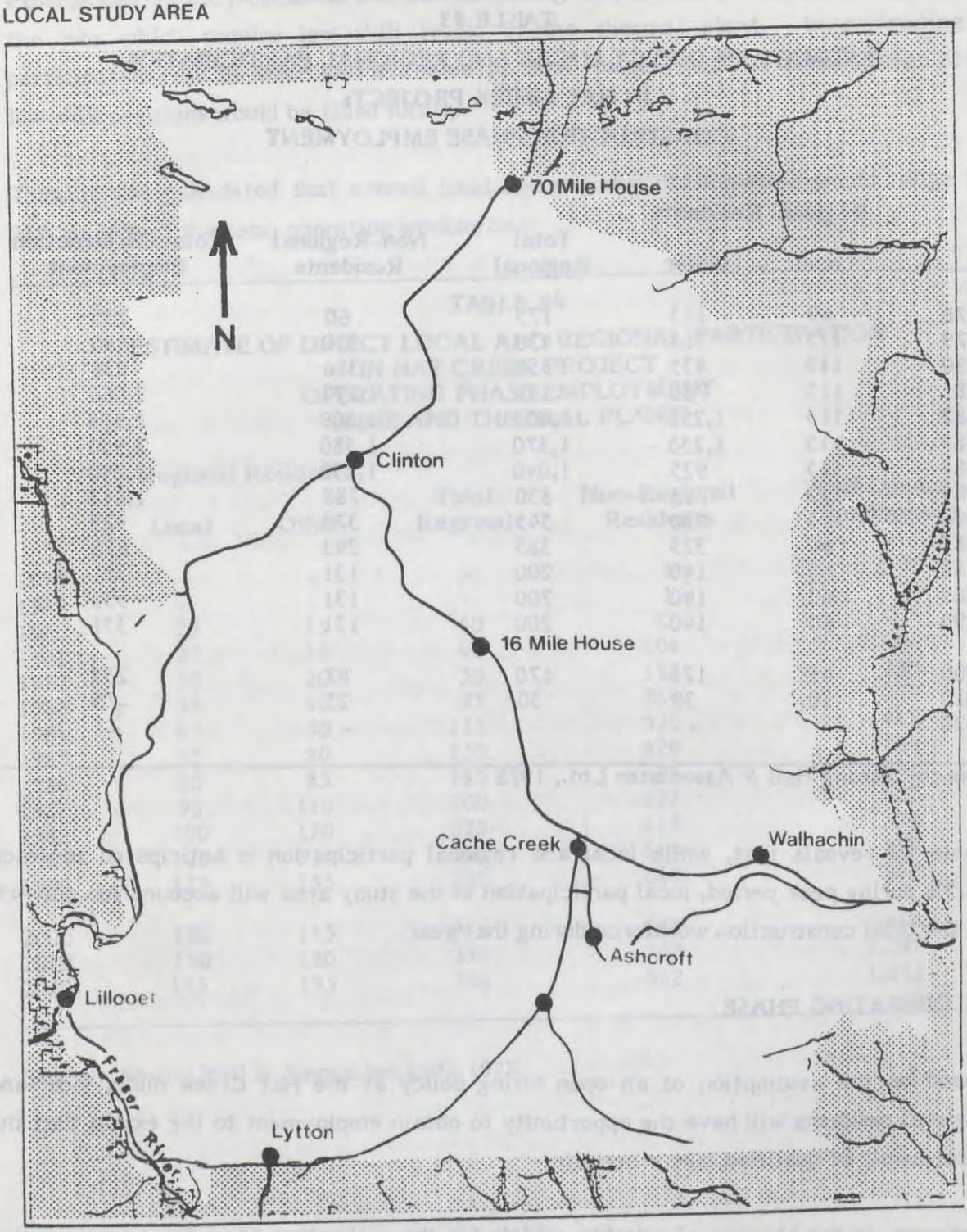


TABLE #3

ESTIMATE OF DIRECT LOCAL AND REGIONAL PARTICIPATION IN HAT CREEK PROJECT: CONSTRUCTION PHASE EMPLOYMENT

	Regional Residents				
	Local	Other	Total Regional	Non-Regional Residents	Total Construction Employment
1978	60	115	175	60	235
1979	115	315	430	210	640
1980	115	435	550	386	936
1981	115	780	895	1,171	2,066
1982	115	1,290	1,405	1,509	2,915
1983	115	1,255	1,370	1,580	2,950
1984	115	925	1,040	1,250	2,290
1985	115	715	830	788	1,618
1986	115	430	545	378	923
1987	60	325	385	243	628
1988	60	140	200	131	331
1989	60	140	200	131	331
1990	60	140	200	131	331
2000	45	125	170	87	257
2010	20	30	50	25	75
2020	-	-	-	-	-

Source: Strong Hall & Associates Ltd., 1978

Table #3 reveals that, while local and regional participation is anticipated to reach 46.5% during peak period, local participation in the study area will account for only 4% of the total construction workforce during that year.

B. OPERATING PHASE

Based on the assumption of an open hiring policy at the Hat Creek mine, local and regional residents will have the opportunity to obtain employment to the extent that the local supply of qualified labour permits.

However, in the absence of suitable models for the estimation of regional participation in the mine and thermal plant, the estimates presented in Table #4 are considered to be quite uncertain. These estimates are based on the regional and local participation rates

experienced by the Bethlehem and Lornex Mining Corporations, and local participation in the jobs which require low skill levels in the thermal plant. In estimating the participation rate in these jobs available to local residents, it was assumed that 75% of low skill positions would be filled locally.

Thus, it was calculated that overall local and regional participation would range from 21% to 30% of the total operating workforce.

TABLE #4

ESTIMATE OF DIRECT LOCAL AND REGIONAL PARTICIPATION IN HAT CREEK PROJECT OPERATING PHASE EMPLOYMENT (MINE AND THERMAL PLANT)

	Regional Residents				
	Local	Other	Total Regional	Non-Regional Residents	Total Operating Employment
1978	-	-	-	1	1
1979	-	-	-	1	1
1980	25	15	40	97	137
1981	25	15	40	104	144
1982	30	20	50	183	233
1983	55	40	95	264	359
1984	65	50	115	330	445
1985	75	80	155	429	584
1986	80	85	165	476	641
1987	90	110	200	627	827
1988	100	120	220	618	838
1989	105	135	240	614	854
1990	115	135	250	613	863
2000	130	145	275	668	943
2010	150	180	330	767	1,097
2020	155	195	350	802	1,152

Source: Strong Hall & Associates Ltd., 1978

2.5 INDIRECT AND INDUCED EMPLOYMENT

A. INDIRECT EMPLOYMENT

In terms of indirect employment arising from project expenditures on goods and services, the generation of approximately 35 jobs in the entire region was assumed. These additional 35 jobs are anticipated to be concentrated in Kamloops, as stated in the Detailed Environmental Studies, Impacts, Mitigation, Compensation and Enhancement - Volume II-November 1978, pages 5.1-20 to 5.1-22.

Indirect employment is typically defined as that employment which arises from project expenditures on goods and services. To the extent that project purchases are made from suppliers within the region, regional employment could be increased. The extent of regional and local indirect employment generated by the project is determined by the amount and type of expenditures made to local suppliers.

Most of the equipment, material and supply requirements for the construction and operation of the Hat Creek facilities will be purchased from suppliers outside of the region. This "importing" of goods directly into the region contributes little to the regional economy. However, some purchases, including some earthmoving equipment, trucks, small tools and consumables (e.g. camp catering supplies) will be made from regional suppliers, both producers and wholesalers.

Few, if any, of these requirements for the construction phase would be purchased from suppliers resident in the local study area. Kamloops is the only community in the region capable of supplying a significant proportion of these requirements. Limited regional purchases outside of Kamloops might include lumber from Clinton or Savona and bulk fuels from Ashcroft. Incremental employment associated with these local area purchases would be minor.

Kamloops has a variety of heavy equipment dealers and industrial wholesalers who supply the existing regional mining industry.

It is reported by one major open-pit mining company in the region that they purchase about 40% of their equipment, materials and supplies from Kamloops.

It is considered reasonable to expect that this expenditure pattern would occur at Hat Creek and, if so, the mining operation alone would spend about $5.5 million annually in the region by 1985. This expenditure would increase to about $16.5 million (1976 dollars) by the year 2000. Over the life of the mine, about $400 million would be spent on industrial equipment and supplies in Kamloops.*

The lack of useful precedents makes it difficult to determine the project supply requirements which would be purchased in Kamloops. As a regional distribution centre, Kamloops has a number of goods such as small tools and consumables, which would be available for purchase. The total supply requirements would account for 4% of the contract price**, or capital cost of the thermal plant, which is estimated at $1.0 billion (1976 dollars). A conservative estimate suggests that 50% of these items would be purchased in Kamloops. This expenditure would represent an additional $20 million (1976 dollars) in Kamloops sales during the plant construction period.

The operating phase of the plant would also be expected to contribute little in direct regional purchases. General hardware items would be purchased regionally only if prices are competitive with Lower Mainland suppliers. Should some of this busines go to Kamloops, volume is likely to be small and, by itself, would not be sufficient to justify the location of new suppliers in Kamloops to serve this market.

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* Estimated from "Preliminary Report on Hat Creek Open Pit No. 1", PD-NCB Consultants Limited, Volume I, 1976.

** Ebasco Services of Canada Ltd., personal communication, September 9, 1977.

The provision of catering supplies for the construction camps is a market in which Kamloops would likely play a substantial role although the volume of sales would be fairly small. In discussions with industrial caterers, it has been estimated that about 25% of the food and catering supplies required for the camp would be supplied from Kamloops. Over the life of the construction camp, these expenditures would contribute about $15 million to the Kamloops economy.

It total then, it might be expected that the Hat Creek Project would increase industrial sales in the region, primarily in Kamloops, by about $435 million (1976 dollars) over the life of the project. These increased sales would generate the need for an additional 1,200 man-years of indirect employment, averaging 35 persons per year.*

B. INDUCED EMPLOYMENT

The Detailed Environmental Studies, Impacts, Mitigation Compensation and Enhancement - Volume II - November, 1978, pages 5.1-22 to 5.1-23, provides the following analysis of induced employment resulting from the Hat Creek project:

Induced employment is defined in this analysis to include incremental employment associated with the consumer spending patterns of the project's direct and indirect employees as well as public service employees associated with all project-related population increments.

Induced employment includes additions to the workforce in commercial trade and service sectors, hospitals, municipal government and other service areas. The usual way of estimating induced employment is by means of an employment multiplier. Employment multipliers were estimated as follows:

Ashcroft/Cache Creek	1.42
Clinton	1.35
Kamloops	1.66
Lillooet	1.42

* On the basis of wages constituting 4% of wholesale sales at an average salary of $15,000 per year.

Using these multipliers, induced employment likely to occur in the region and local study area communities, as a result of the Hat Creek Project, is shown in Table #5. It is expected that most of the induced employment will be generated in the local study area, however, due to the consumption and service linkages with Kamloops, that city will also share in both indirect and induced employment growth.

Within the local study area, induced employment increments for the operating phase are assumed to occur in the settlement community of the operating workforce. It is possible, however, due to inter-community shopping patterns among Ashcroft, Cache Creek and Clinton, that this assumption will not hold. The actual result will depend on the promotional ability of business in the individual communities, and possible competitive advantages obtained by a community gaining an increasing population differential over the other communities.

It is further assumed that during the construction phase, the induced employment effects of construction workers will be concentrated in Ashcroft and Cache Creek. Table #5 indicates that approximately 30% of the induced jobs in the local areas will be filled by existing residents, and 60% of the induced jobs in Kamloops will be filled by residents of Kamloops.

2.6 POPULATION INCREASES ASSOCIATED WITH THE HAT CREEK PROJECT

The estimated in-migrant population associated with direct, indirect and induced employment positions is illustrated in Table #5.

The data presented in Table #5 assumes that most of the in-migrant direct employees, during the construction phase, would occupy single status construction camps proposed for the Hat Creek Valley. Of the remaining construction employees, most will reside in the nearby communities, although some are expected to reside in the rural areas. Operating employees, as well as indirect and induced employees, are expected to reside in the communities and surrounding rural areas and not in segregated camps.

TABLE #5

ESTIMATE OF LOCAL AND REGIONAL PARTICIPATION IN THE INDIRECT AND INDUCED EMPLOYMENT ASSOCIATED WITH HAT CREEK PROJECT

	Local Area		Rest of Region (Kamloops)		Total Regional Indirect and Induced Employment
	Induced Employment	Local Area Residents	Indirect and Induced Employment	Regional Residents	
1978	20	5	5	-	25
1979	55	15	15	10	70
1980	160	50	80	50	240
1981	265	80	115	70	380
1982	420	125	175	105	595
1983	480	145	205	125	685
1984	490	145	220	130	710
1985	465	140	205	125	670
1986	465	140	205	125	640
1987	470	140	225	135	695
1988	460	140	225	135	685
1989	465	140	225	135	690
1990	470	140	225	135	695
2000	490	145	235	140	725
2010	490	145	225	145	715
2020	485	145	225	135	710

Source: Strong Hall & Associates Ltd., Cornerstone Planning Group Ltd. and Urban Systems Ltd. - Hat Creek Project - Detailed Environmental Studies - Impacts, Mitigation and Enhancement - Volume II - 1978, page 5.2-3.

In estimating the distribution of in-migrants throughout the region, the B.C. Hydro Detailed Environmental Study identifies the determining factors to include the following:

- commuting time and expense from place of residence
- cost of serviced land
- availability of residential land
- property tax levels and utility rates
- natural features of community - climate, view, recreation opportunities
- lifestyle preference - urban, semi-urban, rural

The following table illustrates the relative location of the communities to the proposed mine and site and thermal plant. It is assumed that access to Ashcroft and Cache Creek would be via a proposed access route along Medicine Hat and Cornwall Creeks, and access to Clinton would be via Highway 12.

TABLE #6

DISTANCE FROM COMMUNITIES TO HAT CREEK PROJECT

Community	Approximate Road Distance in Kilometres	Approximate Travel Time in Minutes
Ashcroft	25 (16 miles)	20
Cache Creek	30 (19 miles)	25
Clinton	51 (32 miles)	40
Lillooet	67 (42 miles)	60

Source: Urban Systems Ltd., 1978

Based on a discussion of the foregoing factors, the 1978 Detailed Environmental Studies conclude that, in spite of higher housing prices, Ashcroft and Cache Creek would attract 80% of the incoming residents, and that the distance and travel time to Lillooet would be prohibitive.

However, in an attempt to assess the effects of population changes, the Environmental Impact Statement, 1981, identifies the following two potential scenarios:

TABLE #7

DISTRIBUTION OF INCREMENTAL POPULATION

	Scenario I	Scenario II
Ashcroft	56%	24%
Cache Creek	24%	56%
Clinton	15%	15%
Lillooet and Rural Areas	5%	5%
	100%	100%

Source: B.C. Hydro Envronmental Impact Statement, 1981, p.19-8.

The proximity of Ashcroft and Cache Creek, coupled with the lack of any obvious settlement constraints in either community, makes a quantitative prediction of settlement distribution difficult. Thus, the two scenarios maintain the same total population in the Ashcroft/Cache Creek area, while reversing the relative distribution between the two villages.

Table #8 illustrates the projected population in the Villages of Ashcroft, Cache Creek and Clinton. The total project population increase due to the Hat Creek project by 1995 is 3,947 persons. However, Table #8 shows only an increase of 3,700 persons out of the total 3,947, due to the fact that Lillooet and rural areas have been excluded from the table.

2.7 COMMUNITY IMPACTS

Based on the foregoing discussion of population projections on the Villages of Ashcroft, Cache Creek and Clinton, Table #9 provides a summary of the community services required to support such populations, as stated in the Detailed Environmental Studies.

TABLE #8

PROJECTED POPULATION OF NEARBY COMMUNITIES WITH THE HAT CREEK PROJECT

	Clinton		Ashcroft			Cache Creek		
Year	Without Project	With Project	Without Project	With Project Scenario No. 1	With Project Scenario No. 2	Without Project	With Project Scenario No. 1	With Project Scenario No. 2
1983	1150	1200	2450	2500	2450	1200	1200	1200
1984	1150	1200	2700	2800	2700	1350	1400	1450
1985	1150	1250	2700	3000	2800	1350	1400	1650
1986	1150	1300	2850	3350	3050	1500	1700	1950
1987	1150	1600	2850	4800	3550	1500	2200	3100
1988	1150	1650	2850	4800	3700	1500	2300	3400
1989	1150	1700	3050	5250	4000	1600	2500	3800
1990	1150	1700	3100	5000	3900	1600	2500	3550
1991	1200	1700	3150	5100	3950	1650	2500	3600
1992	1200	1800	3200	5350	4100	1650	2600	3800
1993	1250	1800	3200	5350	4100	1700	2600	3800
1994	1250	1800	3300	5450	4200	1700	2650	3900
1995	1250	1850	3300	5500	4250	1750	2700	3900

Notes: Scenario No. 1 - Split of Ashcroft/Cache Creek incremental population - 70% Ashcroft, 30% Cache Creek.

Scenario No. 2 - Split of Ashcroft/Cache Creek incremental population - 30% Ashcroft, 70% Cache Creek.

Data are rounded to the nearest 50.

Source: British Columbia Hydro and Power Authority, Environmental Impact Statement., April 1981, page 19-8

TABLE #9

COMMUNITY SERVICES REQUIRED TO 1990

DUE TO HAT CREEK PROJECT

Community Services	Ashcroft		Cache Creek		Clinton
	Scenario 1	Scenario 2	Scenario 1	Scenario 2	
Elementary School Classrooms	17	7	6	15	5
Elementary School Teachers	17	7	8	19	5
Total Housing Units	625	270	265	525	170
Secondary School Classrooms	16		-		-
Secondary School Teachers	22		-		6
Hospital Staff	up to 23				
Dentists	1		1		
Ambulance Operators	1		1		
RCMP Officers	up to 7 officers		up to 7 officers*		2
Commercial Floorspace	20,644-25,800 sq.ft.		20,644-25,800 sq.ft.		minimal

* would be able to serve both communities

Source: British Columbia Hydro and Power Authority Detailed Environmental Studies-Impacts, Mitigation Compensations and Enhancement - Volume II- November 1978, Section 5.5

These estimates are out of date, however, they have been included in this study to provide a general indication of the community services required as a result of the Hat Creek project.

SECTION 3

CURRENT EMPLOYMENT PROJECTIONS

As mentioned, B.C. Hydro has recently commenced the revision of the socioeconomic impacts of the Hat Creek project. The only updated information which is presently available is the projected direct labour requirements over the period from 1984 to 2034.

Table #10 illustrates the most recent estimate of the construction workforce requirements, and Table #11 illustrates the direct employment requirements, based on the current Hat Creek project schedule.

TABLE #10
CONSTRUCTION EMPLOYMENT
HAT CREEK 2000 MW PROJECT

Year	Powerplant	Mine	Offsites	Environment	Total
1984	237	63	248	1	549
1985	314	105	319	2	740
1986	958	312	393	2	1,665
1987	2,259	377	714	14	3,364
1988	3,745	435	127	17	4,324
1989	3,876	140	50	17*	4,083
1990	3,180	66	27	-	3,273
1991	1,986	0	25	-	2,011
1992	419	0	17	-	436
1993	0	0	15	-	15
1994	0	0	6	-	6

Source: B.C. Hydro & Power Authority, unpublished estimates as at Nov. 13,1981.

TABLE #11

OPERATION EMPLOYMENT

HAT CREEK 2000 MW PROJECT

Year	Powerplant	Mine	Environment	Total
1984	0	4	0	4
1985	1	4	0	5
1986	14	40	0	54
1987	17	221	0	238
1988	105	318	*	423
1989	142	464		606
1990	190	561	17	768
1991	234	655	17	906
1992	236	723	17	976
1993	236	816	17	1,069
1994	236	857	17	1,110
1995-2004	236	883	17	1,136
2005-2014	236	818	17	1,071
2025-2034	0	0	13	13

Source: B.C. Hydro & Power Authority, unpublished estimates as at Nov.13,1981.

A comparison of Tables #2 and #10 reveals a substantial increase in the size of the construction workforce required over the first nine years of construction. The current peak construction requirement at 4,324 workers is nearly 50% greater than the former projected peak labour requirement of 2,950 workers.

A comparison of Tables #2 and #11 reveals that the peak operating labour requirement is currently estimated to be 1,136 employees over the period from 1995 to 2004, as compared to the former peak requirment of 1,152 workers in the year 2000. Thus, the most recently employment projections indicate slightly higher direct labour requirements earlier in the project's life.

SECTION 4

COMMERCIAL AND INDUSTRIAL DEVELOPMENT OPPORTUNITIES BASED ON UPDATED EMPLOYMENT PROJECTIONS

4.1 INDUSTRIAL DEVELOPMENT OPPORTUNITIES

Industrial development opportunities within the local study area can only be identified when B.C. Hydro publishes a detailed study of equipment purchasing and servicing patterns. However, as discussed in Section 2.5 A, Indirect Employment, the preliminary Detailed Environmental Studies of 1978 indicated that the project would create approximately 35 indirect jobs, most of which would be concentrated in Kamloops.

As stated, the relatively low indirect job generation rate is attributable to the fact that most of the equipment, material and supply requirements for the construction and operation of the Hat Creek facilities will be purchased from suppliers outside the region. It has been indicated that most of the required materials and equipment will be shipped into the local area by rail and then transferred to trucks for delivery to the site. In order to transfer these materials from the rail cars onto highway trucks, a special offloading facility would have to be constructed near the railway.

As indicated by the Detailed Environmental Studies, the trans-shipping terminal would require an additional spur track, an access road, an enclosed gravelled work area, an office building, and a stiff-leg derrick. This facility would generate increased train and truck traffic and, if located in Ashcroft, could possibly be used by other mining operations to reduce transportation costs on imported materials and equipment.

B.C. Hydro is presently evaluating four potential sites for the construction of the trans-shipping terminal and the results of this evaluation will be released upon its completion. It is clearly recognized that if B.C. Hydro elects to employ the BCR, rather than the CNR in its choice of trans-shipping terminals, the Village of Lillooet would experience a greater impact from the proposed Hat Creek project than indicated in the 1978 Detailed Environmental Studies.

Another offsite facility which could affect the local study area, is the location chosen for the airstrip which will service the Hat Creek project. The Environmental Impact

Statement cites the Cameron Ranch as a probable location for an airstrip suitable for small jet aircraft. However, discussions with representatives of B.C. Hydro indicate that the following additional sites are presently under consideration:

- Semlin Ranch
- Ashcroft Ranch
- Campbell Hill

Until recently, the Campbell Hill site has been the most probable location, however, the Ministry of Transportation has indicated that the Campbell Hill site would be quite expensive to develop, and does not recommend it.

4.2 COMMERCIAL DEVELOPMENT OPPORTUNITIES

A. THE DEMAND FOR OFFICE SPACE

The demand for office space, unlike most other forms of real estate development, is unique because it is not a direct function of population. The demand for office space is not only related to the number of people employed, but rather it is a function of the distribution of employment among the various sectors of the economy which will ultimately determine the nature of the office demand.

In terms of office space required for the Hat Creek project, the Environmental Impact Statement indicates that there will be an administration and maintenance complex located on the site, north of the mine.

Based on the limited industrial growth potential in the study areas, as indicated in B.C. Hydro's studies to date, it is anticipated that there will not be a significant spin-off demand generated for offsite office space as a result of the Hat Creek project.

B. HOSPITALITY FACILITIES

The recent employment estimates indicate a 50% increase in the number of construction workers required on the Hat Creek project during the peak period. Associated with this temporary transient type labour force is an increased demand for hospitality facilities such as eating and drinking establishments, and hotels. However, the data which is currently available does not permit a detailed analysis of this type of demand. The

demand for this type of facility will largely depend upon the provisions in the construction camps on-site, and the allowances made for those workers who choose to find alternative facilities.

A detailed analysis of the demand for hospitality services in the local areas would require the consideration of the combined effects on demand from the Hat Creek project, Valley Copper project, and the proposed Coquihalla Highway.

C. TOURISM

Discussions with B.C. Hydro indicate that public tours of the project will be provided during the summer months. The tour program will be geared toward the following three types of parties:

- casual observers who view the project from the two proposed look-outs,
- those who take regularly scheduled tours,
- organized tour groups.

The proposed tourist facilities will include a visitors' parking area, a display area, a guardhouse and two look-outs. The entrances to the tourist facilities will be off Highway #12, and the proposed access road.

B.C. Hydro proposes to commence the tours several times per day and adjust tour schedules according to the experienced level of demand.

While the Detailed Environmental Studies do not provide any visitation projections, discussions with a representative of B.C. Hydro have provided the following visitation statistics from other B.C. Hydro projects:

W.A.C. Bennett Dam - G.H. Shrum Generating Station

Year	Annual Visitors
1981	27,101
1980	33,000(estimate)
1979	34,000(estimate)
1978	31,437
1977	31,868
1976	29,988
1975	29,675
1974	32,944
1973	32,952
1972	35,804
1971	33,866
1970	34,198

B.C. Hydro indicates that the public is well aware of the tour program at the G.M. Shrum Generating Station, and that visitation is anticipated to remain relatively stable. This level of visitation provides a striking contrast to the Peace Canyon power project, which is only a ten minute drive from the G.M. Shrum Generating Station and offers more extensive visitor facilities. The Peace Canyon power project offers a complete visitors centre with limited recreational facilities, project education, as well as a history of the area, including models of dinosaurs. Visitation statistics are not available over the period from 1970, however, monthly visitations during 1981 were as follows:

Peace Canyon

Month	Number of Visitors
January	82
February	77
March	120
April	125
May	750
June	1,425
July	4,437
August	4,260
September	1,282
November	639
December	few
Annual	13,197

Thus, it can be observed that the Peace Canyon project received less than half the number of visitors than did the G.M. Shrum Generating Station during 1981.
Limited statistics are available on the number of visitors to the Mica Creek project:

Year	Number of Visitors
To end of October-1981	3,275
1978	4,040
1977	3,370

Thus, it would appear that annual visitation to the largest earth-filled dam in the free world has remained relatively stable since 1977.

It is evident that the number of annual visits to the various B.C. Hydro projects fluctuates dramatically. Due to limited statistical information, combined with the features of each tour facility, it is difficult to predict annual visitation to the Hat Creek project. However, it seems highly probably that the first thermal generating power plant in British Columbia will capture widespread public interest. Furthermore, tours of the Hat Creek project, coupled with tours of the world's largest copper mine, possess great potential to attract an increasing number of visitors, and ultimately, to increase the number of tourist nights in the study area by visitors choosing to spend one day viewing each project.

4.3 RETAIL FACILITIES

The demand for retail and related services can be identified as a function of existing retail expenditure patterns and population growth.

For the purposes of this analysis, the following assumptions have been made in determining the demand for retail facilities resulting from the Hat Creek project:

- the planned and existing retail facilities in the Villages of Ashcroft, Cache Creek, Clinton and Lillooet are representative of current and anticipated demand without the project

- no portion of the increased retail expenditures will flow to other centres, specifically Kamloops

- the increased direct employment will be treated as an absolute increase and not take into account the potential job switching resulting from potential overlap with other major projects, or induced employment due to the Hat Creek project.

- in assessing retail demand, only permanent increases in local retail expenditures can be considered, thus the construction workforce is not included in our assessment of retail floorspace potential

It should be noted that the effects of local participation in the workforce have been excluded from this analysis. As indicated by the low estimates of local participation in previous B.C. Hydro studies, this component of the workforce will not significantly alter the outcome of the calculation.

Detailed population estimates, together with retail expenditure statistics, are required to make a detailed analysis of retail demand resulting from the Hat Creek project. Such figures are presently the topic of an additional study by B.C. Hydro, therefore, the following calculation has been made on the basis of some general assumptions in the previous B.C. Hydro studies.

Accordingly, the population estimates which will be employed in our analysis are calculated as follows:

peak operating employment (Section 3)	1136
x regional average household size (1976 Census)	3.2
Total increase in population	3635

The distribution of the population is assumed to be as follows:

Village	Distribution	Population Increase
Ashcroft	40%	1,454
Cache Creek	40%	1,454
Clinton	15%	545
Lillooet and Rural Areas	5%	182
Total	100%	3,635

Source: Thomas Consultants Inc. estimate based on B.C. Hydro's analysis of commercial floorspace demand.

INCOME AND EXPENDITURE RELATIONSHIPS

In order to determine the retail sales potential in the local trade areas, it is important to analyze the income and expenditures of the trade area residents. Data has been obtained from the Census Canada statistics which provide a profile of the total income and expenditure distribution in the trade area. This is broken down into retail expenditure patterns for food and convenience goods, and department store type merchandise (DSTM).

In estimating retail sales potential in the local trade area, the calculations are based on constant 1981 dollars.

In the Province of British Columbia, retail expenditures account for approximately 50% of per capita personal disposable income (PDI). The total retail expenditure per capita is evenly distributed over the following three categories: automotive and related, food and convenience merchandise, and DSTM.

The food and convenience category includes such items as food, drugs and personal services, while the DSTM category includes apparel, hardware, home furnishings and general merchandise.

In determining retail space requirements, estimates can only be made for convenience and DSTM merchandise.

Given that 1981 PDI is an estimated $9,000 in the Province of British Columbia, retail expenditures are an average of $4,500 per capita. Of the total $4,500, convenience and DSTM expenditures would account for two-thirds, or $3,000. Accordingly, this would be

divided equally between convenience and DSTM expenditures, each accounting for $1,500.

Thus, the convenience and DSTM expenditures in the study areas are calculated as follows:

Village	Population Increase	DSTM and Convenience Expenditure
Ashcroft	1,454	$2.18M
Cache Creek	1,454	2.18M
Clinton	545	.82M
Lillooet	182	.27M
Total	3,635	$5.45M

To justify warranted retail floorspace, a sales productivity level of approximately $250 per sq.ft. is required for convenience floorspace and $125 per sq.ft. is required for DSTM floorspace. Thus, in 1981 constant dollars, the retail potential resulting from the Hat Creek project is as follows:

Village	DSTM Floorspace Requirement (Sq.Ft.)	Convenience Floorspace Requirement (Sq.Ft.)	Total Floorspace Requirement (Sq.Ft.)
Ashcroft	17,448	8,724	26,172
Cache Creek	17,448	8,724	26,172
Clinton	6,540	3,270	9,810
Lillooet	2,184	1,092	3,276
Total	43,620	21,810	65,430

Thus, the total retail potential generated in the study area due to the Hat Creek project is 65,430 sq.ft. This total represents a substantial increase over the B.C. Hydro estimates of 41,288 to 51,600 sq.ft., as indicated in Section 2.6.

Approximately 70% of the total convenience floorspace requirements, or 15,267 sq.ft., would be allocated to food expenditures.

In terms of the impact on the individual communities, the following scenario is envisaged when the retail requirements of Ashcroft and Cache Creek are combined.

A. ASHCROFT AND CACHE CREEK

The population increase resulting from the Hat Creek project would generate sufficient demand to warrant a neighbourhood convenience shopping centre of 60,000 sq.ft. The suggested tenant mix would be as follows:

Category	Square Feet
Department Store - Junior	12,000
Non-Dept. Store Specialty DSTM	13,000
Supermarket	16,000
Specialty Food	1,000
Eating and Drinking	3,000
Personal Services	6,000
Home Improvement Centre	5,000
Financial Institution	4,000
	60,000

The centre would be anchored by a junior department store such as The Bay National, Robinson's, or Fields, and a supermarket.

The 13,000 sq.ft. non-department store DSTM space would be fashion oriented, with heavy emphasis on women's and men's apparel, children's wear, nature crafts and other specialty items. It would be anchored by major national specialty stores.

The specialty food category should be represented by 1,000 sq.ft. of space, and include a bakery, delicatessen, etc.

The remaining categories (Eating and Drinking, Services, Financial/Institutional) have been designated space in accordance with the overall size of the centre and with regard to the specific outlets necessary to provide a total-service neighbourhood centre.

In the Eating and Drinking category, one major restaurant should be located in the first phase, together with a small food fair containing fast food outlets located around a common eating area.

In Personal Service, 6,000 sq.ft. is recommended to house a broad range of activities including: drugstore, barber shop, beauty salon, dry cleaning depot, repair outlets, travel agent, phot ·grapher, optometrist, etc.

In the Financial category, 4,000 sq.ft. of Financial/Institutional space is recommended to accommodate a major bank branch, together with other uses such as a real estate/insurance office, a finance company branch office, etc.

In Home Hardware, 5,000 sq.ft. would be recommended. A centre of this size supports such uses, and would help round out the total range of goods and services offered such a shopping centre.

Estimated employment for a centre of this size would include 65 full-time and 30 part-time employees.

B. CLINTON

The additional demand in retail floorspace generated as a result of the Hat Creek project would warrant an additional 6,500 sq.ft. variety store, or alternatively, several smaller stores which would provide a broad range of services. The following tenant mix is envisaged:

Convenience Foodstores	3,000 sq.ft.
Variety Store	2,500 sq.ft.
Work Wear and Western Apparel	1,000 sq.ft.
Hardware	2,000 sq.ft.
Jewellery, Gifts, Cards, etc.	1,000 sq.ft.
	9,500 sq.ft.

C. LILLOOET

The additional demand in retail floorspace generated as a result of the Hat Creek project would warrant an additional 2,200 sq.ft. of DSTM floorspace and a 1,000 sq.ft. convenience foodstore. It is envisaged that the 2,200 sq.ft. of DSTM floorspace would be a variety store.

APPENDIX

REFERENCES, PARTS I AND II

The following private corporations, governmental agencies, ministries and municipalities provided data to our firm in the preparation of this study:

Arrow Transportation
Bethlehem Copper Corporation
British Columbia Hydro and Power Authority
Canada Employment and Immigration Commission
Canada Mortgage and Housing Corporation
Canadian National Railway
Canadian Pacific Railway
Canadian Public Affairs Consulting Group
City of Kamloops
Craigmont Mines Ltd.
Crown Tire Ltd.
Dekalb Mining Corporation
Don Ference and Associates Ltd.
Finning Tractor Ltd.
H.A. Simons (International) Ltd.
Highmont Mining Corporation
Lornex Mining Corporation
Merrill Lynch Royal Securities Ltd.
Mining Association of British Columbia
Ministry of Energy, Mines and Petroleum Resources
Ministry of Industry and Small Business Development
Ministry of Transportation and Highways
Norcast - A Division of Noranda Mines Ltd.
Office of the British Columbia Coal Co-ordinator
Placer Resources Ltd.
Simons Advertising Ltd.
Skega Rubber Ltd.
Thompson-Nicola Regional District
Trimac Transportation Systems Ltd.

Valley Copper Mines Ltd.
Village of Ashcroft
Village of Cache Creek
Village of Clinton
Village of Lillooet
Village of Logan Lake

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