

THE UNIVERSITY OF MANITOBA

A METHODOLOGY
FOR THE EVALUATION
OF ALTERNATIVE
SINGLE ENTERPRISE COMMUNITIES

BY

LOUIS PAUL JOSEPH RICHARD

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE
STUDIES IN PARTIAL FULFILLMENT OF THE
REQUIRMENTS FOR THE DEGREE OF MASTER
OF CITY PLANNING

DEPARTMENT OF CITY PLANNING

WINNIPEG, MANITOBA

SEPTEMBER, 1979

A METHODOLOGY
FOR THE EVALUATION
OF ALTERNATIVE
SINGLE ENTERPRISE COMMUNITIES

BY

LOUIS PAUL JOSEPH RICHARD

A dissertation submitted to the Faculty of Graduate Studies of
the University of Manitoba in partial fulfillment of the requirements
of the degree of

MASTER OF CITY PLANNING

© 1979

Permission has been granted to the LIBRARY OF THE UNIVER-
SITY OF MANITOBA to lend or sell copies of this dissertation, to
the NATIONAL LIBRARY OF CANADA to microfilm this
dissertation and to lend or sell copies of the film, and UNIVERSITY
MICROFILMS to publish an abstract of this dissertation.

The author reserves other publication rights, and neither the
dissertation nor extensive extracts from it may be printed or other-
wise reproduced without the author's written permission.



ACKNOWLEDGEMENTS

The guidance of Professor Mario Carvalho in the preparation of this thesis is appreciated. The assistance of the readers, Dr. Kent Gerecke and Dr. James B. Nickels is also acknowledged. A special appreciation is also extended to the numerous people who provided written and verbal information which was most helpful in preparing this thesis. Finally, I must express my most sincere appreciation to my wife Jean and my two sons, Kevin and Stephen who provided encouragement, support and most of all patience during the preparation of this thesis.

ABSTRACT

This thesis was written to overcome a current problem in the planning of isolated single enterprise communities; namely the lack of detailed evaluation of alternative community types. The three basic community types considered in this thesis are the family community with housing and other community services for the family; the short term community where the employee commutes usually on a weekly basis between the work site and a regional centre where his family lives; and the long term community which is similar to the short term community except the employee commutes on a six to twelve month schedule.

A detailed methodology based on Morris Hill's Goals-Achievement Matrix was developed to evaluate the three alternative community types. The selection of economic and quality of life factors used in the evaluation was based on an extensive review of literature. For the long term community, literature was quite limited so the author had to rely on information obtained from site visits and discussions with residents of long term communities. An appendix on quality of life in isolated single enterprise communities is provided to give the unfamiliar reader a better understanding and a "feel" for this topic.

The methodology was tested by applying it in three case studies which examined the decision to build a particular type of community. Leaf Rapids, Manitoba was selected as the example of the family community;

Rabbit Lake, Saskatchewan, the short term community; and Hall Beach, N.W.T., the long term community. The results of the evaluation showed that the preferred community type was only built in the case of Rabbit Lake. In the other two case studies, the "second-best" choice of community type had been built. This shows the value of using the methodology proposed in this thesis to improve the quality of recommendations to decision-makers.

In all three case studies, the short term community was the preferred choice but this will not always be the outcome. In the case of Leaf Rapids, the results were almost a "tie". For Hall Beach, the long term community was the most economical and had the second highest quality of life index. This shows that all three community types are viable alternatives for consideration in any evaluation of alternative community types. The requirements of future communities will vary with many factors which precludes any generalization of the order of preference of the alternative community types.

The methodology used in the evaluation is flexible. Additional factors or values can be introduced to the evaluation to reflect unique characteristics of the population, the major employer or the proposed community site. During the research for this thesis, it was noted that literature was very limited on the long term effects of family separation for employment reasons. This is an important topic requiring future research.

The evaluation showed that the failure to fully consider alternative community types can result in the construction of a community

which is costlier for the major employer and provides a lower quality of life for the residents. The use of the methodology proposed in this thesis should prevent a reoccurrence of such results. In addition, it may indicate better ways of achieving national objectives such as northern development and native employment.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	iii
ABSTRACT	iv
TABLE OF CONTENTS	vii
LIST OF TABLES	ix
LIST OF MAPS	ix

CHAPTER	PAGE
1. INTRODUCTION	
1. Purpose	1
2. Definitions	2
3. Historic Perspective	4
4. Problems	7
5. Future Community Development	12
6. Methodology	13
7. Test of Methodology	22
8. Theoretical Framework	23
9. Thesis Organization	29
2. EVALUATION FACTORS	
1. Introduction	30
2. Economic Factors	34
3. Quality of Life Factors	39
a. Identification of Factors	40
b. Relative Weight of Factors	47
c. Factor Indicators and Ratings	55
4. Conclusion	64
3. APPLICATION OF METHODOLOGY	
1. Introduction	67
Case Study I: Leaf Rapids	67
2. Economic Analysis	69
3. Quality of Life Analysis	76
4. Decision Evaluation	82
Case Study II: Rabbit Lake	84
5. Economic Analysis	86
6. Quality of Life Analysis	91
7. Decision Evaluation	95
Case Study III: Hall Beach	96
8. Economic Analysis	99
9. Quality of Life Analysis	104
10. Decision Evaluation	109
11. Summary	109

CHAPTER	PAGE
4. CONCLUSION	
1. Summary and Findings	111
2. Strengths and Limitations	114
3. Future Research	120
APPENDICES	123
A. Quality of Life Addendum	124
B. Transportation Data	175
C. Leaf Rapids: Facilities and Services	176
D. Rabbit Lake: Population of Labour Source Communities	177
BIBLIOGRAPHY	178

LIST OF TABLES

TABLE		PAGE
1.	Hill's Goals Achievement Matrix	15
2.	Quality of Life Matrix	20
3.	Economic and Quality of Life Factors	32
4.	Quality of Life Factor Summary	65
5.	Leaf Rapids: Economic Summary	76
6.	Leaf Rapids: Quality of Life Matrix	81
7.	Leaf Rapids: Analysis Summary	82
8.	Rabbit Lake: Economic Summary	90
9.	Rabbit Lake: Quality of Life Matrix	94
10.	Rabbit Lake: Analysis Summary	95
11.	Hall Beach: Economic Summary	104
12.	Hall Beach: Quality of Life Matrix	108
13.	Hall Beach: Analysis Summary	109
14.	Case Studies Evaluation Summary	112

LIST OF MAPS

MAP		PAGE
1.	Canada: Single Enterprise Communities	6
2.	Leaf Rapids Location	68
3.	Rabbit Lake Location	85
4.	Hall Beach Location	97

Chapter 1
INTRODUCTION

1. Purpose

The purpose of this thesis is to develop and test the feasibility of a methodology to evaluate various community types for isolated single enterprise communities. Isolated single enterprise communities are communities with a single major employer usually located in a remote area of the country.¹ The major employer is the primary reason for the establishment of the community and employs the majority of the working population. The term single enterprise community rather than single industry or resource community is used since it encompasses a wider range of major employers. In addition to the extraction of non-renewable resources or the development of renewable resources, the major employer could be involved in transportation, communications, defence or government administration.

The three basic community types considered in this thesis are:

- a. the family community
- b. the short term commuting community
- c. the long term commuting community

The methodology will provide a detailed evaluation of these three community types to assist decision-makers in selecting which community type is best suited to accommodate the work force. This detailed evaluation will maximize choice since alternative community types would not be casually dismissed.

¹ J. Douglas Porteous, "Creating Cities for Northern Canadians", Habitat, Vol. 18, No. 415, p.7.

This thesis is considered a first step in the planning of isolated single enterprise communities. From a review of literature and information from the major employer, a scenario for each of the three community types can be generated and evaluated by an interdisciplinary planning team. Alternative planning concepts for each community type can also be developed but this and subsequent activities described in the next paragraph are beyond the scope of this thesis.

Based on the preceding information, a methodology must be developed to obtain user and resident inputs into the planning process. These inputs would confirm or deny the assumptions made by the planners and give them guidance for future planning of the community. With this additional information, the planners can adjust their initial evaluation of the three community types. Based on the revised evaluation, the planners can recommend to decision-makers an order of preference for the three community types along with a detailed evaluation of each. After the decision is made, the planners, with further inputs from the users and residents, can then commence on the detailed design of the selected community type.

2. Definitions

Due the variations in terminology which may be applied to the three community types, the following definitions have been developed by the author to clarify their use in this thesis.

Family Community. The family community is one which provides accommodation for both the employee and his family. Included in the community are commercial and institutional services to meet some of the basic needs of the family members. This category includes variations of the family community such as the "company" town, and the "open" or "self-governing" town. The concept of expanding an existing nearby

community rather than building a new community as advocated by West² is not discussed since this thesis deals with isolated communities where the nearest community would not be within daily commuting distance. The mobile or non-permanent community where the employee and the family live in mobile or transportable homes would also be included in the term "family community".³

2b. Short Term Commuting Community. The short term commuting community is a single status community where facilities are provided only for the employees at the work site. The employee commutes a long distance on a predetermined schedule between the work site and the home community or regional centre where his family resides. The long distance precludes daily commuting. For the short term commuting community, the employee works less than one month (usually one week) at the work site and returns home for a rest period of usually one week. Porteous uses the term "long range commute-in town" to describe this type of community.⁴ This term refers only to the commuting distance and does not distinguish between a short duration of stay (1-4 weeks) at the work site and a longer period (4-6 months). For the preceding reason, the author's terminology is necessary. Hereafter, this community type will be referred to as the short term community.

2c. Long Term Commuting Community. The long term commuting community is a single status community similar in concept to the short term community except the employee remains at the work site for a period of four

² W.R. West "An Evaluation of Alternative Resource Community Plans by Cost Benefit Analysis", MCP Thesis, University of Manitoba, April, 1976.

³ V.J. Parker, The Planned Non-Permanent Community, Department of Northern Affairs and Natural Resources, Northern Co-ordination and Research Centre, Ottawa, 1963.

⁴ Porteous (1975), p.9.

or more months before returning home for a holiday of one month or more. It is necessary to distinguish between the two types since the duration of the work period affects the economics and the quality of life of the single status communities. As for the previous definition, the word commuting will be deleted in future references to this community type.

2d. Quality of Life. Quality of life "implies not only a person's mental (or physical) health but also his adaptation to the world, his satisfaction with it and his adjustive attempts either to harmonize himself with it or to alter it for his greater fulfillment."⁵ In his study, Lucas noted that residents of single enterprise communities learn to live within their limitations, lower their level of expectations, become resigned to events or leave the community.⁶ In this manner residents fit themselves to the community or try to change the community to fit their expectations. Quality of life will be further described in terms of its component factors or elements in the next chapter and also in Appendix A.

3. Historic Perspective

Development of Canada's hinterland has given rise to many single enterprise communities which have a single major employer involved in resource development, administration, transportation or defence. As pointed out by Ira M. Robinson, "one of the distinctive features of Canada's settlement patterns has been the creation of completely new towns, located beyond the settled areas of the south, each built around

⁵ James B. Nickels and John P. Kehoe, Northern Communities: Mental Health and Social Adaptation, Centre for Settlement Studies, University of Manitoba, Winnipeg, December, 1972, p.17.

⁶ Rex A. Lucas, Minetown, Milltown, Railtown, University of Toronto Press, Toronto, 1971, p.406.

a single resource-based industrial enterprise".⁷ Map 1 shows the location of some of the single enterprise communities mentioned in this thesis.

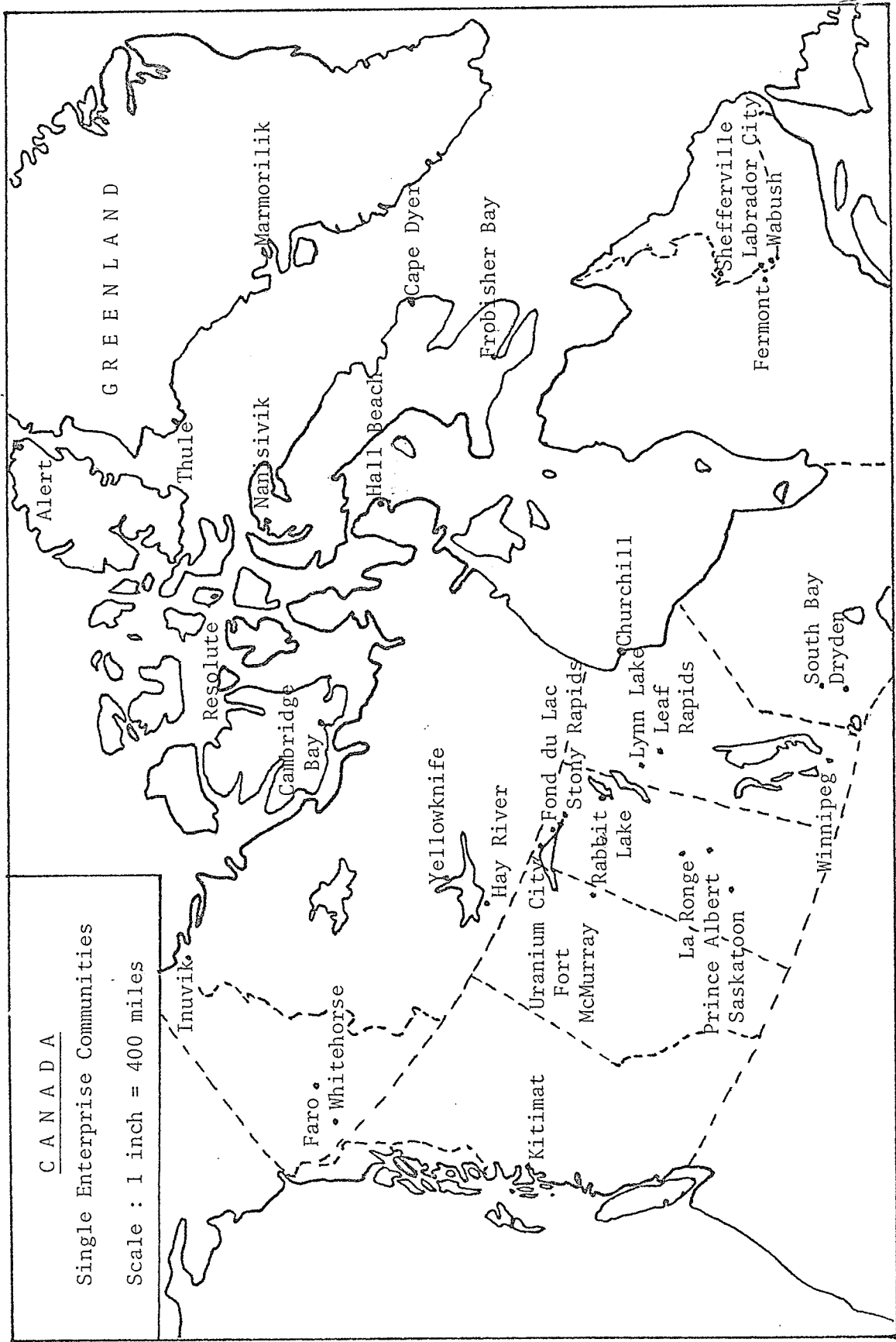
In the early and mid-twentieth century, the company town version of the family community predominated. The single major employer usually provided the workers and their families with all community facilities such as housing, entertainment, recreation and education. Examples of such company towns are Schefferville, P.Q. and Lynn Lake, Manitoba.

In the 1950's, long and short term communities received attention. The military built long term communities in the high Arctic to meet national defence requirements. These included the Distant Early Warning (DEW) Line sites and Canadian Forces Station Alert, N.W.T., where personnel work for a period of six or more months at a time. In 1956, an article was written in the journal, The Canadian Architect, which described the concept of workers commuting weekly from a regional community to a work site.⁸

Two decades later the three community types are still being considered. The family community has changed from a company town to the self-governing town. A general dissatisfaction with the company towns by residents caused the provincial, territorial and/or federal governments to become involved in the planning and establishment of

⁷ Ira M. Robinson, New Industrial Towns on Canada's Resource Frontier, Dept. of Geography, University of Chicago, Research Paper No. 73 (Chicago 1962), p. iii.

⁸ "The Northern Habitat" The Canadian Architect, November 1956, p. 29. An adaptation by C. Ross Anderson of a document prepared by Ross Anderson, Frank Chapman, Peter Goering, Kunio Hidaka, Fraser Milne, Anthony Roberts, Peter Stokes and Jacqueline Tyrwhitt.



single enterprise communities to meet the needs of the workers. Recent examples include Leaf Rapids, Manitoba and Nanisivik, N.W.T.. In 1972, a long term community was built at Marmorilik, Greenland where mining employees work a period of four months and then receive a one month paid holiday.⁹ In 1975, Gulf Minerals Canada Limited started operating its short term community for its mine at Rabbit Lake, Saskatchewan. The short term community is also being considered for potential mining operations at Cluff Lake, Saskatchewan and Little Cornwallis Island, N.W.T. In 1977, the Science Council of Canada identified the commuting by air from urban areas to northern mines as an area requiring further assessment.¹⁰ For the more recent communities, some consideration has been given to one alternative community type but the evaluation of the other two community types, if even considered, has often been shallow.

4. Problems

Single enterprise communities have unique problems due to their development and purpose. A basic problem is the very limited evaluation which is usually given to alternative community types when deciding which community type to build. Other problems include high rates of labour turnover and a low quality of life in the community.

4a. Evaluation

An extensive review of literature for this thesis produced very little evidence to indicate a detailed evaluation of alternative community

⁹ P.J. Noakes, "Development of a Stable Social Unit at the Black Angel Mine", CIM Bulletin, February, 1978, p. 56.

¹⁰ Northward Looking, A Strategy and a Science Policy for Northern Development, Science Council of Canada, Report No. 26, Supply and Services Canada, Ottawa, August, 1977, p. 78.

types was carried out for new isolated single enterprise communities. Where alternative community types are considered, the evaluation has been cursory with most of the attention focused on the alternative designs of a predetermined community type.

A recent example is the feasibility study for the mining development at Nanisivik on northern Baffin Island. This study considered three types of communities: a short term community, a closed company town, and an open town with private home ownership and local government. "All parties associated with the planning of the project to date have expressed their preference for the third alternative."¹¹ In this report of almost 500 pages, the preceding sentence is the only explanation given for the selection of the community type. There is no rationale given for the preference of the selected alternative nor any reference to any study or report which thoroughly evaluated the alternatives.

Arvik Mines Ltd. is examining the feasibility of a short term community for a lead-zinc mine on Little Cornwallis Island, N.W.T.¹² As well, the Saskatchewan government expects the French consortium, Amok Ltd. to establish a similar community for its uranium mine at Cluff Lake in 1979.¹³ The Department of National Defence is considering a long term community for its proposed "Arctic Base". In most cases, only a casual consideration is given to either of the other two alternative community types.

¹¹ Watts, Griffis and McOuat Limited, Feasibility Study of the Strathcona Sound Project, 1973, p.237.

¹² J.E. Barrett and Associates, "The Polaris Project and the Inuit," Vancouver, B.C., November 1976.

¹³ Ray Gainer and Hedley Auld, "Economic Base Study, Uranium City, Saskatchewan", report for the Airports and Properties Branch of the Ministry of Transport Central Region, September, 1976, p.12.

The chief advantage of the single status communities is the lower capital cost which is recognized in the preceding examples. However, for a fair comparison of the three types of communities, other tangible costs such as operation and maintenance costs as well as intangible costs such as quality of life for the residents must be examined in a rational analysis of the three community types. These costs are usually considered in the design of a preconceived community type, but usually little or no detailed evaluation is made of alternative community types. This is contrary to the concept of a learning society which Friedmann states "must be reluctant to say "no" to any new design for living without full knowledge of its expected consequences."¹⁴

By not fully evaluating the alternative community types, the reasonableness of any decision to build a specific community type may have been decreased.¹⁵ Also the decision may be less than optional for the major employer, the employees, their families and the environment.

4b. Labour Turnover

Labour turnover has often been used to justify changes in community planning. Although the size of the community and its degree of isolation have some effect on labour turnover in mining communities, work related factors were by far the most frequent reasons given for

¹⁴ John Friedmann, Retracking America, Anchor Press/Doubleday, Garden City, New York, 1973, p. 205.

¹⁵ Paul Davidoff and Thomas A. Reiner, "A Choice Theory of Planning", A Reader in Planning Theory, Andreas Faludi (ed). Pergamon Press, Oxford, England, 1973, p. 15.

high labour turnover.¹⁶ Annual turnover rates varied from zero to 384% with an average turnover cost of \$1,012 per worker in 1972. Average replacement costs for a married worker can be as high as \$10,000.¹⁷

Labour turnover costs can be reduced by selective recruitment of employees. Research has shown that married employees change jobs less frequently than single employees. Labour turnover could also be reduced by improvements in working conditions and to a lesser extent improvements in the communities. Characteristics of the community which cannot be improved such as the distance to larger urban centres could have attention diverted from them through the use of imaginative and attractive townsite design.¹⁸ With annual turnover costs in the mining industry estimated at \$48 million in 1974, a careful evaluation of alternative community types and their design can well be afforded.¹⁹

¹⁶ J.A. MacMillan, J.R. Tulloch, D. O'Brien and M.A. Ahmad, Determinants of Labour Turnover in Canadian Mining Communities, Centre for Settlement Studies, University of Manitoba, Winnipeg, Manitoba, May 1974, p.65; "Resource-Based or One-Industry Towns and the Natural Environment", Report on the Yellowknife Symposium sponsored by the Canadian Participation Secretariat for Habitat; United Nations Conference on Human Settlements, Vancouver, 1976, held at Yellowknife, N.W.T. September 12-13, 1975 (mimeographed), p.9; J.E. Winston Jackson and Nicholas W. Poushinsky, Migration to Northern Mining Communities; Structural and Social-Psychological Dimensions, Centre for Settlement Studies, University of Manitoba, Winnipeg, Manitoba, 1971, p.43.

¹⁷ L.B. Siemens, Single Enterprise Community Studies in Northern Canada, Centre for Settlement Studies, University of Manitoba, Winnipeg, Manitoba, December, 1973, p.21.

¹⁸ H.D. Linn and J.C. Stabler "Economic, Social and Planning Requirements for Northern Communities", Saskatoon, Saskatchewan, March 1976, p.3 - 29.

¹⁹ Ibid, p.2 - 10.

Linn and Stabler's review of migration studies in Canada revealed a strong preference among migrants for the larger cities of over 100,000 population. This trend of increased urbanization may make it more difficult to attract people to remote single enterprise communities.²⁰ This trend has also been noted in the mining industry in its attempts to attract and maintain a stable workforce in remote communities.²¹

2c. Quality of Life

Isolated communities also have problems with the quality of life afforded to the residents. The limited opportunities and facilities, as compared to an urban centre, greatly restrict people's choice of activities. These restrictions in choice are particularly noticeable in the availability of housing, medical services, education facilities, recreation/entertainment facilities, and goods and services. Although the natural physical environment may be desirable, the climate is usually harsher than that accustomed to by southern Euro-Canadians. The isolated nature of the community usually restricts the residents' ability to travel outside the community as well as to communicate with the "outside world". Such restrictions contribute to a reliance on interpersonal relationships among the residents. The susceptibility of the major employer to changes in technology, markets or government policy creates an air of impermanence which makes it difficult for the community to fully develop.

The single status communities also pose special problems. Frequent air travel for the short term community affects the safety of

²⁰ Linn and Stabler, p.3-11, C.D. Burke, D.J. Ireland "Holding the Line: A Strategy for Canadian Development", Urban Prospects, Ministry of State for Urban Affairs, 1976, p.11.

²¹ Noakes, p.52.

travelling workers. The separation of worker from the rest of the family may create social problems for the spouse and children.

To offset these problems, there is an increased closeness to nature and residents tend to be friendlier to each other.²² High wages, subsidized housing, and other employee benefits also serve to attract workers to isolated communities. As well, a small community provides a generally uncomplicated life style free of most of the stresses and worries normally found in a large urban centre.²³

5. Future Community Development

To reduce the preceding problems, careful planning and a full evaluation of alternative community types will be required for future single enterprise communities. With an increasing demand for both renewable and non-renewable resources, pressures, both economic and political, will force development in Canada's north. As Eric Gourdeau stated, "The North has recently revealed its enormous material riches and nothing, it seems, will prevent its exploitation."²⁴ Some of the federal government's national objectives in the north are as follows:

"to maintain and enhance the northern environment with due consideration to economic and social development;

to encourage viable economic development within regions of the Northern Territories so as to realize their potential contribution to the national economy and the material well being of Canadians;

²² Clifford G. Bancroft, Mining Communities in British Columbia: A Social Infrastructure Analysis, for B.C. Department of Mines and Petroleum Resources, University of Victoria, January, 1975, p.28.

²³ Lim and Stabler, p.4-22; G.F. Parsons, Arctic Suburb: A Look at the North's Newcomers, Department of Indian Affairs and Northern Development, Northern Science Research Group, Ottawa, 1970, pp.18, 19.

²⁴ Eric Gourdeau, "The Dilemma", The Arctic Dilemma: Man and His Environment Versus Resource Development, The Arctic Institute of North America, Montreal, January 1971, p.1.

to maintain Canadian sovereignty and security in the North"²⁵

As a result of these objectives and pressures, development in the sparsely populated, undeveloped areas of Canada will occur. It is just a question of when and how.

With this development, communities will be required to accommodate the work force. Since northern Canada is sparsely populated, many of the communities will be "new" communities often located a hundred or more miles from the nearest settlement. Careful evaluation will be required to select the community type which best satisfies the needs, objectives, and desires of the major employer and the residents. The community selected should also be in harmony with its natural environment and have a minimal detrimental impact on its natural surroundings. This should reduce the problems previously discussed for future isolated single enterprise communities.

6. Methodology

To increase choice and the reasonableness of future decisions to build a single enterprise community, the costs and benefits of each alternative community type must be evaluated. Two alternative methods for evaluating costs and benefits in community planning are Nathaniel Lichfield's "balance sheet of development" and Morris Hill's Goals - Achievement Matrix (GAM).²⁶

²⁵ Canada's North 1970-1980, Department of Indian Affairs and Northern Development, Information Canada, Ottawa, 1972, p.10.

²⁶ Nathaniel Lichfield, Peter Kettle and Michael Whitebread, Evaluation in the Planning Process, Pergamon Press, Oxford, England, 1975; Morris Hill, "A Goals-Achievement Matrix for Evaluating Alternative Plans," Decision-Making in Urban Planning, Ira M. Robinson (ed), Sage Publications Inc., California, 1972, pp.185-207.

Lichfield proposed a "balance sheet of development which considered all costs and benefits with respect to a range of community goals, not just the single goal of economic efficiency. The planning balance sheet ... provides a summary of the planning advantages and disadvantages to the public at large." It also identifies the sections of the community which receive the benefits of the plan as well as those who pay the costs. Hill's main criticism of the planning balance sheet is that "it fails to recognize that costs and benefits can be compared only if they can be related to a common objective."²⁷ Hill's criticism does not apply in the analysis of the three community types since each plan has the same overall objective: the optimum accommodation of the work force.

Hill proposed a goals-achievement matrix where costs and benefits are defined by their ability to achieve goals or objectives. Each objective has a cost-benefit account in terms of some measurable index using a nominal, ordinal, interval, or ratio scale. Relative weights are assigned to each objective to indicate its degree of importance to the entire community. The level of achievement for each objective is estimated and then multiplied by the relative weight of the objective and the results presented in a matrix form. The weighted achievement levels are summed (where possible) to give an overall index of objective achievement for each plan. An example of Hill's GAM format is shown in Table 1.

²⁷ Hill, pp.188-191.

Table 1: Hill's Goals - Achievement Matrix²⁸

Z				Y		
Goal Description				Y		
Relative Weight				Y ₁		
Group	Relative Weight	Cost	Benefits	Relative Weight	Cost	Benefits
a	A ₁	A ₁ xZ ₁ xN _a =D	A ₁ xZ ₁ xM _a =E	A ₂	A ₂ xY ₁ xS _a =H	A ₂ xY ₁ xR _a =J
b	B ₁	B ₁ xZ ₁ xN _b =F	-	B ₂	-	B ₂ xY ₁ xR _b =K
c	C ₁	-	C ₁ xZ ₁ xM _c =G	C ₂	C ₂ xY ₁ xS _c =L	-
		Σ	Σ		Σ	Σ

Legend: N and S represent costs for the respective group for each goal as indicated by the subscripts;

M and R represent benefits for the respective group for each goal as indicated by the subscripts;

(-) indicates no cost or benefit to the group for that particular goal in the matrix.

In this example, X and Y are descriptions of the goals with each goal having the relative weight indicated. The persons, groups or establishments affected by the proposal are listed under group as a, b, and c. A relative weight is determined for each group either for each goal individually or for all goals together. The letters D, E, F, etc. are the products of the costs or benefits, the relative weight of the cost or benefit for the group, and the relative weight of the goal. In dealing with uncertainty, a range of costs and benefits is preferable to a

²⁸ Hill, pp.195-200.

specific value.²⁹ Thus the letters D, E, F, etc. could also be considered as a range of values rather than solely as a single value.

The costs or benefits may be defined in monetary or non-monetary units or in terms of qualitative states. Where costs and benefits are in quantitative terms, they can be added as shown in the example by the symbol Σ . This cannot be done when costs and benefits are in different units. Care must be taken in the selection of units for each goal or factor. For example, if travel safety was measured by the flying time, there would be a great difference in values if one used 180 minutes instead of 3 hours. If the other factors use a measurement with low numerical values (ie. 10 or less), then the use of a large number such as 180 would heavily bias the evaluation.

Ideally Hill's method should use a scale where the costs and benefits can be rated using a common range of units so they can be added together. An example of such a value system is one which uses +1 where goals - achievement is increased, -1 where goals - achievement is decreased, and 0 if there is no effect on goals achievement. This would provide a set of values for costs and benefits for each factor or goal which could be summed into a weighted index of goals - achievement. Such a summation would provide a single numerical result for each community type. Although this would readily provide an order of preference for the three community types, it would not provide the decision maker with the actual monetary cost of each community. Without this cost, the decision maker is unable to weigh the actual monetary differences in economic costs against the benefits of the alternative community types. Although a

²⁹Hill, pp. 194-5.

particular community type may be highly desirable, if its economic cost is extremely high, it could adversely affect the economic viability of the major employer's planned operation at the work site. These disadvantages will prevent the use of such a scale in the thesis methodology.

Hill's GAM does not identify the principles of measurement. These principles include identifying the groups in society who pay the cost or receive the benefits; identifying the nature of the cost or benefit; and establishing a suitable measure for the costs or benefit to reflect their value relative to other costs and benefits. This lack of precision in the GAM is considered by Lichfield as a reflection of Hill's intention that the matrix should be all things to all men which exposes the method to much subjectivity. It is left up to the evaluators to decide on the principles of measurement and to construct their own rationale for the evaluation. Thus, in any utilization of Hill's GAM, the principles of measurement and the rationale for the evaluation must be stated so the merits of the evaluation and the correctness of those principles can be judged by the decision makers and/or critics.³⁰

Hill's GAM is designed to measure the achievement of goals while Lichfield's balance sheet is designed to determine the consequences of alternative plans for the welfare of affected groups.³¹ This difference can be eliminated in the methodology by having two main goals: economic efficiency and the maximization of quality of life opportunities. Thus, by determining the consequences of each alternative community type, the

³⁰Lichfield et al, pp. 91-2.

³¹Lichfield et al, pp. 96-7.

goals are also achieved.

Hill's method offers some advantages over Lichfield's planning balance sheet although an examination of planning studies indicated there are many similarities between the GAM as applied in practice and the planning balance sheet. Lichfield has noted the difference between the format of a typical balance sheet and Hill's GAM "seems to simply amount to the introduction of weights between different groups within the community and the weighting of objectives".³² It is this difference which prevents the use of the planning balance sheet in the quality of life component of the evaluation since residents of single enterprise communities do not attach the same level of importance to all quality of life factors.

The thesis methodology uses a modification of Hill's GAM whereby the economic and quality of life components will be dealt with separately. This is a modification in format rather than in concept to facilitate the presentation of information for the evaluation. Although Hill's method is capable of simultaneously dealing with both economic and quality of life components, the presentation of information would be a complex matrix which would be more difficult to understand than the presentation herein.

The first component deals with the economic costs to the major employer and is similar to the traditional cost-benefit analysis which deals mainly with economic efficiency. The capital and operating costs for each community type are determined to enable decision makers to compare the community types on an economic basis. The second component

³²Lichfield et al, pp. 80, 97.

deals with the more intangible aspects of quality of life. The quality of life component will compare the three community types on the basis of desirability where the maximization of choice or positive impacts will be regarded as more desirable. In the quality of life analysis, no distinction will be made between costs and benefits. Since degree of choice, desirability, or impact will be used to rate each factor, a high rating could be considered a benefit while a low rating could be considered a cost. To determine at which point the degree rating for a factor would become either a cost or a benefit would be a difficult, time-consuming, and subjective exercise. The two components proposed in the thesis provide a more workable and more readily understood format than Hill's GAM format.

The elements or factors which comprise quality of life are used as components of the main goal which is to maximize the quality of life. These elements of quality of life are identified from an extensive review of literature and will be further discussed in the next chapter. The quality of life component is applied only to the effect on the residents of the three community types. It is assumed the major employer's benefits would be economic in nature such as improved production and profits. It is assumed that the residents of the community, who directly experience the benefits of the community, do not directly pay the economic costs of the community with the possible exception of municipal taxes.

Each quality of life factor is given a relative weight to indicate the relative level of importance of residents attach to each factor. For each factor the degree of choice, desirability or impact is

rated on an ordinal scale and is determined for both the employee and the family. In some cases, the lack of reliable data may require the planners to exercise some judgement in assigning relative weights to factors or assigning the degree of choice, desirability or impact for each affected group.

The rating for each factor is multiplied by the relative weight for each factor. These products are then summed for each group and then for each community type. The following table illustrates the format used for the quality of life component of the matrix.

Table 2: Quality of Life Matrix

Quality of Life Factor	Relative Weight	Community Type					
		Family		Short Term		Long Term	
		Group		Group		Group	
		E	F	E	F	E	F
X	1	VL (1 x 1 x 2) 2	VL (1 x 1 x 2) 2	VL (1 x 1 x 2) 2	VL (1 x 1 x 2) 2	VL (1 x 1 x 2) 2	L (1 x 1 x 3) 3
Y	3	W (1 x 3 x 4) 12	W (1 x 3 x 4) 12	L (1 x 3 x 3) 9	L (1 x 3 x 3) 9	N (1 x 3 x 1) 3	VL (1 x 3 x 2) 6
TOTAL		Σ	Σ	Σ	Σ	Σ	Σ
Quality of Life Index		Σ		Σ		Σ	

In the above example, each quality of life factor is rated on an ordinal scale for the degree of choice, desirability or impact each community provides. The ordinal scale is as follows: wide choice or high desirability (W) = 4; limited (L) = 3, very limited (VL) = 2;

and negligible or nil (N) = 1. The product of each rating, the relative weight of each quality of life factor and the relative weight for each group then appears below each rating. The relative weight for each group is 1 for reasons to be outlined in the following chapter. The letters E and F represent the employee and family respectively while the letters X and Y can represent quality of life factors. The products of each rating, the relative weight of each quality of life factor and the relative weight for each group are summed for each group and then for all groups in each community type.

The economic cost and the quality of life index are then compared for each community type and ranked in order of preference. If the most economical community type also has the highest quality of life index, then it is easy to recommend one community type over the other two. However, if the community type with the highest quality of life index is not the most economical, then the incremental differences in the economic costs and the quality of life index between community types must be examined. This is difficult since costs in dollars must now be compared to incremental differences in the quality of life index which uses an ordinal scale. Other factors such as reliability of data, financial risk of the single enterprise operation, or government objectives could enter the evaluation. This would require further judgements by the planners.

In evaluating the incremental differences, planners must provide quantitative and rational reasons in addition to their informed professional judgements to support their final recommendations to the decision-makers. Hill's GAM could again be used to evaluate the economic costs, quality of life and external factors the planners or decision-makers

may want to consider. In addition, preliminary conceptual designs of the three community types and concepts of operation could be reviewed to reduce costs and/or increase the quality of life index. Based on the preceeding reasons or revisions, the planners should recommend the community type which provides the best compromise between economic efficiency and quality of life. This applies only in the case where the most economical community does not have the highest quality of life index.

7. Test of Methodology

To test the feasibility of applying the methodology, an example of each community type will be evaluated to determine if the existing community was the most preferred type. Leaf Rapids, Manitoba, a mining community, was selected as the example of the family community since it was recently constructed and it is considered a highly preferable form of the family community.³³ Since there are few short term communities in Canada, selection was quite limited. For this example, another mining community, Rabbit Lake, Saskatchewan was selected due to its recent construction and the availability of literature. For the example of a long term community, the DEW Line site at Hall Beach, N.W.T. was selected due to the author's personal familiarity with the site. Being a defence establishment, it provides a difference in major employer activity from the other two mining communities.

The communities selected to test the methodology have a maximum population of 2,200 for the family community; 283 for the short term community and 363 for the long term community. This thesis will not test

³³ Linn and Stabler, p. 3-22

the methodology for upper population limits. It is considered that as the population of the family community increases, the quality of urban services will increase. However, each planning problem will have some unique characteristics which could result in an exception to any generalization one may arrive at for population limits. Each proposed community should be evaluated to determine which community type best fits the site and the expectations of both the residents and the major employer. The results could be revealing.

8.Theoretical Framework.

The proposed methodology involves several theoretical concepts relating to choice, evaluation, goodness of fit, and participation in the planning process. Choice is used in the definition of the planning task where the three community types are identified as alternatives for evaluation. Participation of prospective residents is used to obtain data to determine values for the quality of life analysis and the evaluation of the three community types. The goodness of fit concept seeks to optimize the solution to the problem. This is also the purpose of the evaluation which is to recommend the best choice to decision-makers. This relationship of these concepts to the planning process forms a theoretical framework for the methodology proposed in this thesis.

8a.Choice.

Planning is a process for determining appropriate future action through a sequence of choices.³⁴ This can be done by a rational process based on empirical information where all viable alternatives are considered, the consequences of each alternative identified and evaluated

³⁴ Davidoff and Reiner, p. 11.

resulting in the selection of a preferred alternative.³⁵ This is the essence of the proposed methodology.

The consideration of the three alternatives is consistent with the use of the planning process to "widen the range of choice of future conditions...and opening opportunities where choice may be exercised." The proposed methodology provides the decision-maker with a range of choices and the implications of each choice. In this way the method is both rational and comprehensive.³⁶

8b. Evaluation

"Evaluation embraces the whole process of comparing plans: the framework devised for the analysis, the principles of assessment, the measures employed in the comparison, and the marshalling of evidence".³⁷ Lichfield, Kettle and Whitbread identify plan evaluation as a distinct planning activity which is also related to the other activities in a general planning process. In the definition of the planning task, the approach to the design and evaluation of alternative plans must be formulated. Prior to the data collection phase, the data required for the evaluation should be determined so that as much of the data can be collected in one rather than two or more separate efforts. This data collection should also enable the planners to determine the relative importance of the achievement of various objectives or goals.

³⁵ John Friedmann, "Planning as a Vocation", Plan Canada, Vol. 6, No. 3, 1966.

³⁶ Davidoff and Reiner, p. 16, 17.

³⁷ Lichfield et al, pp. 4, 5, 19-21.

Plan evaluation can be broken down into four sub-activities: measurement of levels of achievement of objectives; appraisal of evidence produced; setting down of findings in a logical framework; and making recommendations to decision-makers.³⁸ In this thesis, the measurement of levels of achievement of objectives involves the determination of economic costs and the level of opportunity for resident satisfaction for each quality of life factor. These costs and factors are then evaluated using Hill's GAM and the results discussed. An order of preference of community types is then available for the decision-maker.

8c. Goodness of Fit

The evaluation of alternative community types to determine which is best suited for a given situation is consistent with the "goodness of fit" concept proposed by Christopher Alexander.³⁹ Alexander's concept seeks to optimize the relationship between the form, which is the solution to the problem, and the context, which defines the problem. In this case, "the human background which defines the need for new buildings and the physical environment provided by the available sites make a context for the form" which will be one of the three community types.⁴⁰ To determine which community type has the highest degree of fit with the context, the three community types are compared using a list of factors which identify potential misfits. By reducing the number of misfits, the degree of fit is increased. However, the factors are often interrelated

³⁸ Ibid, p. 20.

³⁹ Christopher Alexander, "The Goodness of Fit and Its Source", Environmental Psychology: Man and his Physical Setting, Harold M. Proshansky, William H. Ittelson, Leanne G. Rivlin (editors), Holt Rinehart and Winston Inc., New York, 1970, pp. 42-56.

⁴⁰ Ibid, p. 43.

so by eliminating a misfit in one area, another misfit may be introduced in another area.⁴¹ For example, recreation and entertainment facilities could be improved but this would increase costs (a decrease in fit) and perhaps improve mental health and/or sense of community (an increase in fit). Thus many of the variables are interconnected so any change in one variable results in changes, either increased fit or misfit, in other variables.

It is possible that a minor cultural change could result in a presently good fit being considered a misfit in future years. For example, if employees in the single status community begin to dislike the commuting lifestyle after a few years, the major employer may have difficulty in retaining present employees or attracting new employees to the work site. Dissatisfaction with a family community could have the same effect. The single status communities have an advantage since they can be expanded into a family community if a change in preference occurs in the future. However, the family community would be a capital loss in such a case since less than 25% of the existing accommodation would be needed for a single status community.

Although the goodness of fit concept may have been applied in the past to optimize a particular community type, the degree of fit obtained may not have been the best. For example, in designing a family community for an isolated single enterprise setting, a planner can achieve a high degree of fit between the form and the context. However, the question still remains whether an alternative community type such as the long or short term community would achieve a higher degree of it.

⁴¹ Ibid, pp. 52, 53.

8d. Participation

The input of potential residents is highly desirable to determine the values they hold relative to community planning. The analysis of quality of life relies on the values of the future residents which planners must deal with "to discover which future conditions are presently desired and which may be desired by future clients."⁴² By considering residents values in the evaluation of alternatives, the planner increases "the degree of assurance (of decision-makers and clients) that the choice made was at least as reasonable or more reasonable than any other alternative" and will lead to an improved quality of action.⁴³

The involvement of potential residents in planning could be used to test their receptiveness to innovative or different community and housing designs which could be developed for the community. Innovative design could be both more desirable for the residents as well as less costly for the major employer. This exchange of information would be a form of "mutual learning" which Friedman calls for in his theory of transactive planning.⁴⁴

Usually user/resident input can be done by consultations with elected officials, administrators, community interest groups and by holding public meetings. However, in the planning of new communities, the future residents are usually unknown so their specific values are not obtainable for use in the evaluation. For single enterprise communities, the major employer usually is aware of type of person likely

⁴² Davidoff and Reiner, p. 21.

⁴³ Ibid, p. 28; Friedmann (1973), p. 19.

⁴⁴ Friedmann (1973), p. 185.

to be employed and some general characteristics of the employee's preferences or desires can be ascertained. As well, sample opinions could be obtained from the population at the locations where the major employer intends to recruit its workforce.⁴⁵ Also, the major employer may already be the major employer in other existing single enterprise communities where sample opinions could be obtained from the existing employees and their families.⁴⁶ The problems of single enterprise communities as well as some opinions of residents might also be obtained from existing literature.⁴⁷

From any or all of these sources of resident opinions, relative values could be generally determined for a proposed single enterprise community for use in the quality of life analysis. This would be better than the planner using his own subjective values which is considered a second-best approach to evaluation.⁴⁸ For the purpose of this analysis, the relative weights for goals will be assumed to reflect the general opinion of existing residents of single enterprise communities as obtained from an extensive review of current literature. Thus, the lack of an existing population will not affect the use of Hill's GAM.

⁴⁵ International Surveys Limited, "An Analysis of Eight Group Discussions on a Proposed Employment and Accommodation Plan for a New Mining Development in Northern Saskatchewan", prepared for Gulf Minerals Canada Limited., April 1972, p. 2; F.R. Nogas, "Fly-In Program at Rabbit Lake" CIM Bulletin, Vol. 69, No. 774, October, 1976, p. 127.

⁴⁶ Quebec-Cartier, a mining company, consulted with its employees in Gagnon for the planning of Fermont, Paul J. Bourassa, "La Ville de Fermont", CIM Bulletin, Vol. 70, No. 780, April 1977, p. 107.

⁴⁷ Nogas (1976), p. 125.

⁴⁸ Lichfield et al, p. 9.

This thesis has not generated its own data for resident input in the evaluation. Residents of single enterprise communities have been "over-surveyed" so they have no personal incentive to participate in academic surveys. One recent survey of six resource communities had only a 9% return of questionnaires.⁴⁹ To increase the responsiveness of resident surveys, incentives must be provided. This can take the form of employment opportunities and gratuities or gifts.⁵⁰

9. Thesis Organization

The thesis is organized in methodological steps. Chapter 1, described the problem the thesis will address and the methodology to be used. The second chapter compares to the data gathering phase of the planning process where economic and quality of life factors are identified, along with the relative weight, the social indicator and its rating for each quality of life factor. The description of the quality of life factors in Chapter 2 is brief so more detailed description of each quality of life factor is included as Appendix A for the reader who desires further information. In Chapter 3, the feasibility of the methodology is tested by applying it in three case studies. This compares to the evaluation phase of the planning process. The objective of each case study is to determine which of the three alternative community types best fits the situation. The final chapter summarizes the findings of the thesis, describes the benefits of utilizing the methodology and identifies areas for future research.

⁴⁹ Inventory Report 1976 for Resource Community Development, Ministry of State for Urban Affairs, Ottawa, March, 1977, p. 9-33.

⁵⁰ International Surveys Limited, p. 72.

Chapter 2

EVALUATION FACTORS

1. Introduction

The purpose of this chapter is to describe the economic and quality of life factors to be used in the evaluation, how they were selected and how they will be applied in the methodology. The identification of factors and their use in the evaluation is a most important step in the methodology since these economic and quality of life factors and the relative values assigned to each quality of life factor form the basis for the comparison of alternative community types.

The economic factors were obtained from a review of literature and are described in more detail in the section on economic factors. The costs for each factor were obtained from literature sources and by estimating using cost data. The former costs were adjusted for inflation to 1978 costs. The economic factors are applied solely to the major employer since it was assumed in Chapter 1 that the residents of the community do not directly pay the economic costs of the community. The economic factors are divided into two categories: capital costs and operating costs which form the basis for the economic comparison of the three community types.

To compare quality of life, one must identify the components or factors of quality of life, the relative importance of each and the social indicator which describes or measures each factor.¹ The quality of life

¹ Douglas G. Harland, "Health and Welfare Indicators: Current Canadian Research", Social Indicators, Workshop Papers presented at the Canadian Conference on Social Welfare, Laval University, Quebec City, June 18-22, 1972, p. 4.

factors were identified from an extensive review of literature. The relative weight or importance of each factor, its social indicator and the rating for each indicator was also based on the review of literature. The quality of life factors form the basis for the quality of life matrix which compares the three alternative community types. A relative weight for each factor is determined to reflect the relative importance of each factor in the evaluation.

For each factor, a social indicator is developed to measure the effect of each factor on the residents and each effect is rated for the employee and the family. The degree of choice, opportunity or positive impact of each factor as it affects the residents will be used as the indicator for each factor. This enables the employee and the family to be rated for each community type to eventually determine which community type maximizes choice, opportunity, or positive impacts. The indicator used for each factor and the range of ratings for each indicator are further described in the section on quality of life factors. There are other indicators which could be developed or used in the evaluation but this area is considered beyond the scope of this thesis.

Ideally, the relative weight of each factor and the rating for each indicator should be determined from a survey of prospective residents as mentioned in Chapter 1. However, this thesis relies on information from literature sources since residents in single enterprise communities have been "over-surveyed" as noted in Chapter 1.

The economic and quality of life factors selected for use in this thesis are shown in Table 3. This list reflects those factors determined to be relevant in this thesis and should form a basis from

which other factors can be added or deleted depending on their relevance to the particular situation in future evaluations.

Table 3: Economic and Quality of Life Factors

<u>Economic Factors</u>		<u>Quality of Life Factors</u>
Capital Costs	Site	- Physical Environment
- Amortized Costs		- Isolation
Operating Costs		- Safety
- Municipal Taxes	Residents	- Community Development
- Facilities Operation and Maintenance		- Interpersonal Relations
- Air Commute		
- Meals		- Family
- Housing Assistance	Community	- Housing
- Vacation Bonus		- Recreation/Entertainment
- Employee Salaries		- Education
- Turnover Costs		- Medical
		- Goods and Services

The description of the factors and the rationale for their grouping into the categories will be described in the following sections dealing with economic and quality of life factors.

Since the economic factors use the dollar as the unit of comparison, there is no need to indicate the relative importance of each factor since this will be reflected in the cost for each factor. Since the economic factors are tangible and easily evaluated on a dollar basis there is no need to describe how their values were obtained in the amount of detail necessary for the intangible quality of life factors. The greater amount of detail for the quality of life factors reflects the

greater complexity of the subject rather than a greater degree of importance than the economic factors.

The methodology proposed in this thesis requires an assessment of many economic and quality of life factors. The rational examination of factors for inclusion or exclusion in the evaluation adds to the comprehensiveness of the evaluation. Factors not considered in the case study evaluations such as income tax deductions for capital and operating expenses could, as noted later in this chapter, affect the magnitude of economic differences between community types. In the case where the most economical community type does not have the highest quality of life index, the planning team could examine the effect of including factors such as income tax deductions in the evaluation. This was not done in the case studies due to the complexity of taxation and the confidentiality of tax information.

The most difficult aspect of the methodology is the quality of life matrix. Due to the intangible nature of quality of life, subjective assessments in the evaluation are unavoidable. Although the planning team can obtain some data from prospective residents, the information obtained will be the residents' subjective opinions. In the assignment of relative weights to each factor or in rating each factor for each community type, some subjective judgement will be required where the degree of choice, desirability or impact cannot be clearly distinguished. For example, it may be difficult to decide whether housing or recreation/entertainment should be rated limited or very limited if the numerical analysis of the data indicates a value halfway between the two ratings.

The economic and quality of life factors used in this thesis and the rationale for their selection are identified and briefly discussed

in the next two sections. Additional detail on the quality of life factors is provided in Appendix A for the reader who desires more information about these intangible factors which are more difficult to identify and quantify than the economic factors.

2. Economic Factors

Capital and operating costs are used in the comparison of the three alternative community types. Some costs are unique to the community type. Others directly affect some of the quality of life factors which depend on physical facilities for their activities such as housing and recreation.

The facilities required for the single enterprise will not be compared for each alternative community type, since these facilities are required for the function or role of the major employer. However, regardless of the type of community selected, the major employer requires certain infrastructure which can also be used by the community. Water and sewage treatment facilities are required for the major employer and these could be easily expanded to meet the community's needs if the community and work site are located in close proximity. Whether the municipality (for a family community) or the major employer provides water and sewage facilities is immaterial to this analysis since services would be provided on a cost sharing or cost recovery basis. Independent facilities would be required if the community and work site are quite distant from each other. Capital costs for electrical power would be assumed by a utility company or the major employer and recovered through normal user fees.

The economic analysis is concerned only with the economic costs to the major employer. Costs of municipal, protection, educational and postal services are excluded. It is assumed these costs would be paid by user fees or, either income or municipal taxes. These fees and taxes would be paid by the residents whether they and their families are living in the family community or the regional centre. Economic costs to residents, governments and small private enterprises are also excluded since it is assumed that these costs would be incurred at relatively the same levels for all three community types. For the single status communities, these costs would be incurred in the regional centre where some slight decrease in cost may be realized due to economies of scale.

2a. Capital Costs

The capital cost of each community type reflects some of the facilities provided for the use of the residents. The presence and quality of these facilities also affects the quality of life factors such as accommodation, recreation and goods and services. To avoid repetition, the physical facilities will be discussed under their respective quality of life factor.

The capital costs for the single status communities are limited to the community facilities required for the single workers plus the municipal infrastructure required for these facilities. For the family community, the capital costs also include the major employer's share of municipal costs where government and private industry share in residential, municipal and commercial building costs. It must be realized that different cost sharing agreements and different levels of services and amenities could greatly alter the capital costs. Whether buildings are permanent or transportable would also affect the capital costs. For

the purpose of this thesis, it is assumed that housing and other facilities will be of the latest acceptable designs such as that used in Leaf Rapids, Manitoba and Fermont, P.Q.²

To analyze the capital costs together with the annual operating costs, the capital costs will be amortized at 10% interest compounded yearly for a period of 20 years. It will be assumed the proposed single enterprise will have an expected life span of at least 20 to 25 years. This period of time permits the consideration of permanent structures and infrastructure for the community. Local governments generally issue 20 year debentures for major capital expenditures on municipal services such as roads, water sewerage and street lighting. Capital cost write-offs for income tax purposes allow steel frame structures to be written off about 75% in 13 years while 26 years is required to write-off about 75% of a more durable structure such as concrete.³

2b. Operating Costs

The operating and maintenance costs for the major employer are calculated for each community type. These are limited to those costs relating to the transportation, accommodation, salaries, and benefits of employees.

Annual building operating and maintenance costs are assumed to be 8 1/2% of capital costs. For the family community, it is assumed that dwelling occupants will be owners and pay these costs directly or they will be tenants and pay these costs indirectly in their rent. As a result, operating and maintenance costs for the family community are

² Linn and Stabler, p. 5-33.

³ Ibid, pp. 3-13, 3-14.

calculated on the capital cost of only the single employee facilities. Operation and maintenance costs of municipal facilities are assumed to be paid by the municipal government using tax revenues for the family community only.

Since the major employer is not directly responsible for the provision of municipal services in the family community, it must pay its share of municipal taxes for these services. In the single status communities, all services and facilities are provided by the major employer so there is no requirement to pay municipal taxes since there is no local government at the work site. However, the major employer would have to pay municipal taxes on office and warehouse facilities in the regional centre, which would be needed to support the single status community.

For the short and long term communities, commuting between the work site and the regional centre would be by aircraft. The size of aircraft and frequency of flights would be determined by the size of the work force, the frequency of rotation of the employees and the amount of cargo the major employer may desire to ship by air. Transportation data including aircraft characteristics is provided in Appendix B.

In all communities, meals for single status personnel are provided by the major employer. Any cost recoveries for employees are either absent or very negligible. For the family community, personnel not living in the major employer's single accommodation are not provided with meals. Meal costs include only the food purchase costs plus transportation. Preparation costs are included elsewhere under employees' salaries and building operation costs.

For the employees in the family community, the major employer will often provide assistance programs to recruit and retain employees. Housing assistance in the form of rental or purchase subsidies, low interest or interest-free second mortgages and buy-back clauses are often available.⁴ In 1975, Sherrit Gordon Mines' housing program in Lynn Lake, Manitoba cost an estimated \$1,210,000.⁵ Vacation bonuses for the employee and the family are often provided. Eldorado Nuclear Limited of Uranium City, Saskatchewan annually provides a number of free plane trips to Edmonton for its employees.⁶ Anvil Mines of Faro, Yukon provides their married and single employees with a \$1,000 and \$500 annual vacation bonus respectively to defray vacation expenses.⁷

Employee salaries are a major economic factor. At an average annual income of up to \$20,000 per employee for a single enterprise such as mining, any increase in staff becomes very costly.⁸ The salary costs can include extra overtime and waiting time caused by aircraft flight delays due to poor weather conditions. This would be most applicable to the short term community where flights are very frequent. For the forthcoming analysis, it is assumed that flight delay costs will be negligible.

⁴ Linn and Stabler, p. 5-25; Inventory Report 1976 for Resource Community Development, pp. 5-20, 5-21; Lucas, p. 74; Len Gertler and Ron Crowley, Changing Canadian Cities: The Next 25 Years, McClelland and Stewart Limited, Toronto, 1977, p. 257.

⁵ Inventory Report 1976 for Resource Community Development, p. 3-25.

⁶ Gainer and Auld, p. 25.

⁷ In conversation with P. Grouette, employee of Anvil Mines, Faro, Yukon, during his visit to Winnipeg, Manitoba, 10 May, 1978.

⁸ Inventory Report 1976 for Resource Community Development, p. 4-23, plus 20% inflation.

Staff turnover is also costly due to expenses incurred in recruiting and training new employees. In 1974, the estimated average turnover cost per mining employee was \$1,000.⁹ Today, the cost would be in the order of \$1,400 per employee. These turnover costs do not include any relocation assistance for employees and their families which applies only to the family community. Thus, the cost of \$1,400 has to be increased by the relocation allowance for the community. High turnover rates have an adverse effect on employee productivity which may hinder or even temporarily halt activities due to inadequate manpower. In 1974, the Canadian Mining Association estimated the mining industry could have lost up to \$320 million in revenue due to mines operating at less than full capacity.¹⁰ No attempt will be made to include lost revenue as part of the turnover cost in this analysis. However, if such estimates can be made available and with some degree of accuracy, revenue loss should be included in the turnover costs.

An income tax deduction for capital and operating expenses was not used as an economic factor since it is assumed any tax deduction would merely be a percentage of annual operating and amortized costs. This would only affect the magnitude of economic differences between community types and not their order of economic preference.

3. Quality of Life Factors

Among social science studies, there is no clear consensus about elements of quality of life, their relative importance or the social indicators to be used to measure these elements of quality of life. However,

⁹ MacMillan et al, p. 65.

¹⁰ Linn and Stabler, p. 2-10.

many elements are common to most studies although there are some variations in terminology and the grouping of some elements into one major element.¹¹

3a. Identification of Factors

Based on an extensive review and synthesis of the literature relating to quality of life in single enterprise communities and urban centres, the following quality of life factors were selected by the author to illustrate the methodology: physical environment, isolation, safety, community development, interpersonal relationships, family, housing, recreation/entertainment, education, medical, and goods and services.

The factors of housing, education, goods and services, medical, recreation/entertainment, physical environment, isolation, and interpersonal relationships were selected since there was a general consensus in the literature about these factors as elements of quality of life.¹²

¹¹ Dorothy Walters, "Social Intelligence and Social Policy" and Norman Pearson "Livability Indicators", Social Indicators, Proceedings of a Seminar, January 13-14, 1972, Ottawa, April, 1972, pp. 10, 94-98; Richard Rose, "The Market for Policy Indicators", Social Indicators and Social Policy, Andrew Shonfield and Stella Shaw (ed), Henemann Educational Books, London, England for Social Science Research Council, 1972, pp. 122; J.A. Riffel, Quality of Life in Resource Towns, Ministry of State for Urban Affairs, Ottawa, 1975, p. 6; Lucas, p. 390-408; Inventory Report 1976 for Resource Community Development, p. 9-6; T.S. Palys, "Social Indicators of Quality of Life in Canada: A Practical Theoretical Report", Manitoba Department of Urban Affairs, Winnipeg, Manitoba, August 2, 1973, pp. 117-120.

¹² Lucas, pp. 390-408; Riffel, pp. 67; Palys, pp. 117-120; Inventory Report 1976 for Resource Community Development, p. 9-6; Bancroft, p. 38; Harland, pp. 1, 11; Karl A. Fox, Social Indicators and Social Theory, John Wiley and Sons, New York, 1974, p. 132; Hans Blumenfield, "Criteria for Judging the Quality of the Urban Environment", Occasional Paper No. 14, Faculty of Environmental Studies, University of Waterloo, Waterloo, Ontario, 1974, p. 3; pp. 94-98; J.B. Nickels and D.L. Sexton,

The rationale for the inclusion of the remaining factors and exclusion of factors not listed will be discussed in the remainder of this section.

The factor of housing encompasses the various types of this shelter forms to accommodate the employees and their families. Education refers to the education facilities available for both children and adults. Goods and services includes all commercial sales facilities in the community, religious facilities and professional services excluding medical. The medical factor refers to the availability of mental health and physical health services plus dental services. The factor of recreation/entertainment includes all natural and built facilities used for this purpose. Physical environment refers to both the man-made and natural environment which includes the natural landscape and climate. Isolation is a feeling of being separated, either physically or mentally from others.¹³ Interpersonal relationships refers to the relationships of the residents among themselves. Due to the generally small size of the family community, the residents must live, work, shop, play, and pray together which produces both social control and social conflict.¹⁴

12 (Cont'd)

"Use of Quality of Life Factors to Predict Residents Intentions to Remain in Resource Frontier Communities", Studies of Expected and Effectuated Mobility in Selected Resource Frontier Communities, James B. Nickels (ed), Centre for Settlement Studies, University of Manitoba, Winnipeg, Manitoba, 1976, pp. 109-117.

¹³ Lucas, p. 395.

¹⁴ Ibid, pp. 169, 178, 181.

The elements of safety and family are only mentioned or discussed in a few studies relating to quality of life.¹⁵ These two elements must be included in the analysis because of the nature of the community types being compared. Frequent or infrequent air travel is a characteristic of the community types and increases or decreases the risk of being involved in aircraft accidents. As well, the size of the family or home community will affect the exposure of the family to traffic accidents. Safety at work or in the home is considered to be a function of the safety practices at the work place or home and are independent of the type of community. Thus, only the aspects of air and vehicle/pedestrian safety will be considered in this factor.

Family is also included since two of the community types involve separation of one spouse from the rest of the family for varying periods of time. Family separation and its social effects is not usually considered in the studies previously referred to.

The development of a community involves physical, social and political aspects. The physical aspect is covered under the physical environment and costs. The remaining two aspects are often dealt with separately or combined in various analyses of quality of life. These two aspects will be used in this analysis under the factor of community development.¹⁶ Political development is often guided by enacted

¹⁵ Riffel, pp. 6, 45-57; Pearson, p. 96; Harland, p. 1.

¹⁶ Fox, p. 132; Pearson, pp. 97, 98; Nickels and Sexton, p. 116; Palys, p. 120; Riffel, pp. 51-55; Bancroft, p. 8; Inventory Report 1976 for Resource Community Development, p. 9-6. John M. Cram, "Differential Need Satisfactions of Mine Workers in Northern Canada", Canadian Journal of Behavioural Science, Vol 4, 1972, p. 137.



government legislation.¹⁷ Social development is often hindered by the lack of "sense of community" among the residents and an air of impermanence caused by the community's dependence on the major employer.¹⁸

The grouping of quality of life factors is difficult due to the interrelationships among factors. The selection of quality of life factors seems to be related to the site of the proposed community, the interactions of the residents and the availability of community services.

The location of the site determines the natural landscape which will surround the community and the type of climate the residents will be exposed to. The nature of the site and climate will be a major factor in the final design of the community. The location of the site also affects the degree of isolation of the proposed community and alternative modes of transport. For the single status communities, the site will affect travel safety due to distance and climate.

The interaction of residents in the community influences the development of the community, interpersonal relationships and the family. The following community services are grouped since they are generally a function of the population of the community: housing, recreation/entertainment, education, medical, and goods and services.

Employment is also as common as the selected elements of quality of life but it deals mainly with primary employment and job security, safety and satisfaction. These are assumed to be common to all three community types so they will not vary with community type.

¹⁷ Norman E.P. Pressman, Planning New Communities in Canada, Ministry of State for Urban Affairs, Information Canada, Ottawa, 1975, p. 34; Robinson, pp. 55-6, 144.

¹⁸ Bancroft, p. 8; Lucas, pp. 84, 88.

Secondary employment such as alternative employment for the major wage earner and jobs for the spouse or older children is not considered as a separate element. Since there is only one major employer, the main wage earner in the family usually has no alternative employment opportunities in the community. This is the same for all three community types with the exception of some support trades such as clerical and building maintenance in the family community. Secondary employment opportunities, primarily for other family members, would be reflected in the availability of goods and services, education and recreation in the community. These would provide employment opportunities for clerks, salespersons, teachers, janitors, recreation program assistants, and other service personnel. To consider secondary employment as a separate factor along with goods and services, education and recreation would be a duplication of indicators for factors which may bias the summation of the effect of all the factors. As Ivanovic has noted, "Despite the fact that two given indicators may be very important from the point of view of information they provide separately...the contribution of one of them is insignificant if there is a high degree of correlation between them."¹⁹

Public order, personal safety from crime, etc. is another common element of quality of life and is generally used in the comparison of countries and large cities. Available information suggests serious crimes and liquor and traffic offences are "no more prevalent in resource towns than in other centres".²⁰ Juvenile offences seem to be infrequent in

¹⁹ Branislav Ivanovic, "A Method of Establishing a List of Development Indicators", Social Indicators: Problems of Definition and Selection, UNESCO Press, France, 1974, p. 22.

²⁰ Riffell, p. 49; Human Settlement in Canada, Ministry of State for Urban Affairs, Ottawa, May 1976, p. 67.

resource communities, probably due to the high degree of observability of the residents. As a result, public safety will not be used as a factor in the comparison of the quality of life of the three alternative community types.

Religion is not considered as a separate quality of life factor in this analysis due to its relation to other factors. Lucas notes that "many religious principles have little significance until they are worked out in interpersonal relationships."²¹ Social stratification along religious lines appears to be very limited.²² Bancroft notes that "the youthful age of many residents, the lack of old people, intense recreational organization and activity, the non-stop nature of shift work and the relative absence of need for charitable organizations, are aspects of resource communities that tend to work against the success and survival of churches."²³ Some studies include religious facilities under community services.²⁴ The presence of religious facilities is of relatively low importance to residents.²⁵ It is also low or not even mentioned or categorized on lists of desired community improvements or reasons for

21

Lucas, p.322.

22

J. Douglas Porteous, "Quality of Life in British Columbia Company Towns: Resident Perceptions", Contact: (Special Issue) New Communities in Canada, Norman E.P. Pressman (ed), University of Waterloo, Ontario, 1976, p.338.

23

Bancroft, p.18.

24

Nickels and Sexton, pp.113, 116; Inventory Report 1976 for Resource Community Development, p.9-15.

25

J.S. Matthiasson, Resident Perceptions of Quality of Life in Resource Frontier Communities, Centre for Settlement Studies, University of Manitoba, Winnipeg, Manitoba, 1970, p.12.

migration.²⁶ As a result, religion in the communities would be reflected in the interpersonal relationships of the residents and the religious services and facilities present in the community. Thus it is not necessary to treat religion as a separate factor.

Mental health is often considered as a factor or sub-factor to health in general.²⁷ It has also been the subject of many studies in small isolated northern communities.²⁸ This factor is described in detail for information purposes in Appendix A, but it will not be used in the analysis since there appears to be a high correlation between life problems associated with mental health and factors such as isolation, and those factors relating to the size of the community's population.²⁹

²⁶ Ibid, p. 14; Jackson and Poushinsky, pp. 42-44; Inventory Report 1976 for Resource Community Developments, Appendix, p. A9-10; John S. Matthiasson, "Resident Mobility in Resource Frontier Communities: An Examination of Selected Factors", Two Studies of Fort McMurray, Centre for Settlement Studies, University of Manitoba, Winnipeg, Manitoba, October, 1971, p. 32; James B. Nickels (ed), Studies of Expected and Effectuated Mobility in Selected Resource Frontier Communities, Centre for Settlement Studies, University of Manitoba, Winnipeg, Manitoba, 1976, Appendix B, Table 8-12.

²⁷ Fox, p. 132; Harland, p. 1; Pearson, p. 97; Riffel, p. 42.

²⁸ J.D. Atcheson, "Problems of Mental Health in the Canadian Arctic" and A.P. Abbott and J.P. Kehoe, "Mental Health Practice in the Yukon", Canada's Mental Health, Vol. XX, No. 1, Jan-Feb, 1972; A.A. MacKinnon and A.H. Neufeldt, "A Survey of Mental Health 'North of 60'", Canada's Mental Health, Vol. XXII, No. 1, Jan-Feb, 1974; James B. Nickels and Jack Ledger, Winter, Wilderness and Womanhood: Explanations or Excuses for Mental Health Problems, Centre for Settlement Studies, University of Manitoba, Winnipeg, Manitoba, 1976; Nickels.

²⁹ MacKinnon and Neufeldt, pp. 5, 6.

This will prevent a duplication of indicators which may bias the final analysis.

For the purpose of illustration of the methodology, several assumptions are made for factors which in a real situation would be given and not subject to variation. In this respect, it is assumed the major employer will provide a modern and safe work environment for employees and will have policies and practices which enhance the satisfaction of the employees basic needs plus self-actualization and esteem needs relating to their employment.³⁰ It is also assumed that native land claims will not affect the proposed development. If, in reality, native land claims were involved in the community site, their settlement should be a first priority as indicated by Mr. Justice Thomas R. Berger and Kenneth M. Lysyk in their respective northern pipeline inquiries. The physical design of the community types is assumed to reflect current accepted practice so no attempt is made to develop innovative physical designs.

3b. Relative Weight of Factors

The relative weights given to each quality of life factor in the GAM is the result of an analysis of literature dealing with residents levels of satisfaction with the quality of life and reasons for migration to or from single enterprise communities. The population in the literature is predominantly Euro-Canadian in nature with about 40% coming from rural backgrounds and about 60% from urban backgrounds.³¹

³⁰ Cram, pp. 135-145.

³¹ Jackson and Poushinsky, pp. 35, 38, 40.

The majority of the population in most of the single enterprise communities in the literature consists of young married couples with young children. The single adults are mostly young males with a small number of females. There are few, if any older or retired people.³² The relative weights will reflect the values of young families which are the majority. It is recognized that these weights will vary with the nature of the future residents, their values, expectations, and culture.

The effect of native people on the three community types will be briefly described in Appendix A. Since natives have different cultures, lifestyles, expectations and values from those of Euro-Canadians, this could affect the relative weight of factors. This could change the order of preference of the three community types from the result which would be obtained using only southern Euro-Canadians as a population.

The characteristics of the population can be predetermined to some extent by the major employer by the type of employment offered and selective recruiting of employees.³³ The size of the community, its location, and the physical environment will also affect the value of the relative weights given for each goal as well as the costs and benefits for each group of residents.

It is assumed that the two groups in this analysis, the worker and the family, will attach the same degree of importance to each quality of life factor. Matthiasson's study of residents in Fort McMurray,

³² Riffel, p. 9; Gertler and Crowley, p. 258; Lucas, p. 69; Porteous, p. 334; Inventory Report 1976 for Resource Community Development, p. 9-7, 9-8; Linn and Stabler, p. 2-4.

³³ J.M. Percifield, "New Townsite Visitation Study", Mimeo, Shell Canada, Employee Relations Department, October, 1973, referred to in Riffel, p. 45; Jackson and Poushinsky, p. 126.

Alberta, suggested there was little difference between males and females in their expectations regarding the quality of life in their community.³⁴ Another study of life satisfaction in resource frontier communities found no significant relationships for either sex in a correlation analysis between sociability variables and period of residency. Also, weather had the same effects on both males and females.³⁵ However, the females reported greater satisfaction in relationships with family members if they have social contact with non-family members.³⁶ The study indicated the importance of providing greater social participation opportunities in northern communities, especially for females. In a study of the use of drugs in northern communities, the difference in usage between males and females was statistically insignificant. It was noted, however, that "it appears that the occurrence of human problems throughout the year depends on the type of problem and the sex of the person with the problem."³⁷ There is little evidence in the preceding studies to justify the use of different degrees of importance of the quality of life factors for males or females with the possible exception of interpersonal relationships for females. However, if a survey of prospective residents did reveal a difference in the degree of importance of factors between males and females, the proposed methodology could readily deal with this difference.

³⁴ Matthiasson (1970), p. 17.

³⁵ Nickels and Sexton, pp. 67, 92-3, 134.

³⁶ Ibid, p. 67.

³⁷ Nickels, pp. iii, iv.

The importance of each goal or factor to residents of single enterprise communities has been ascertained from various studies. Although these studies dealt primarily with the family version of the single enterprise community, it is assumed the employees and families of the single status communities would attach the same level of importance to each quality of life factor. If the importance of factors varied with community type, it could still be readily handled in the matrix analysis. The importance of each factor will be weighted on an ordinal scale using 3 for a high degree of importance, 2 for a moderate degree and 1 for a low degree. Since the indicator for each factor deals with the degree of opportunity or impact of activities, they can be added together into an index of the quality of life for each community type.³⁸

Housing is generally considered to have a high degree of importance for residents. Matthiasson's survey ranked housing in the highest of three categories. Other reports also ranked housing very high among other factors relating to order or importance, desired improvements in the community or reasons for migration.³⁹

Isolation or the access to transportation and communication systems is considered to have a high degree of importance. Lucas found it to be a characteristic which was most often referred to in his discussions with residents. Matthiasson's survey ranked isolation or access to southern cities among the highest of three levels of importance

³⁸ Fox, p. 131.

³⁹ Matthiasson (1970), p. 12; Inventory Report 1976 for Resource Community Development, p. A9-11; Jackson and Poushinsky, p. 42-45; Nickels and Kehoe, p. 23; Cram, p. 141-143, Nickels, Appendix B, Table 8-12.

to residents. Various other sources also ranked isolation or access to larger centres among the most important variables or needs for quality of life.⁴⁰ One study indicated that isolation is a factor of low importance in the reasons for migration, but the communities studied were within a half day vehicle drive from a large urban centre.⁴¹

Education and medical services are both rated as having a moderate level of importance to residents. This is confirmed by Matthiasson's survey.⁴² Jackson and Poushinsky's survey showed that few people left their previous community primarily because of poor education or medical facilities. Also, in selection of residents' present communities, schools and medical facilities were not major considerations but it is to be noted that all the communities studied did have these facilities either in them or within a few miles distance.⁴³

The availability of goods and services appears to be of moderate importance to residents of single enterprise communities.⁴⁴ It was also rated of moderate importance among reasons for migration from previous communities.⁴⁵ Priority lists for community improvements ranked goods

⁴⁰ Lucas, p. 48, 194; Matthiasson (1970), p. 12; Inventory Report 1976 for Resource Community Development, Appendix, p. A9-11; Gertler and Crowley, p. 258; Proceedings of the Symposium on Resource Frontier Communities, December 16, 1968, University of Manitoba, Centre for Settlement Studies, Winnipeg, Manitoba, 1968, p. 19; Nickels, Appendix B, Table 8-2, (Whitehorse only).

⁴¹ Jackson and Poushinsky, p. 42-45.

⁴² Matthiasson (1970), p. 12.

⁴³ Jackson and Poushinsky, p. 43, 45.

⁴⁴ Inventory Report 1976 for Resource Community Development, Appendix, p. A9-11; Lucas, p. 231-2.

⁴⁵ Jackson and Poushinsky, p. 42; Matthiasson (1971), p. 32.

and services from high to low.⁴⁶ As a result, a moderate rating is assumed for goods and services since this rating appears to be most common in the literature.

The presence of recreation and entertainment facilities along with voluntary associations is considered to have a high degree of importance to residents. Matthiasson's survey results placed entertainment and recreation facilities at a high level of importance.⁴⁷ Other surveys, particularly those concerned with reasons for migration placed recreation and entertainment at moderate or low levels of importance, as reasons for migration.⁴⁸ Those surveys identifying factors requiring improvement and in order of priority often rated recreation and entertainment low on the priority list.⁴⁹ Reasons for migration and priority lists for improvements reflect resident satisfaction with existing recreation and entertainment facilities, rather than the degree of importance to the residents. Thus, residents of a community well endowed with such facilities would rate these low in order of desired improvements or reasons for migration. Since these facilities play a key role in the prevention of boredom and thus the preservation of mental health, they will be assumed to have a high degree of importance to residents.⁵⁰

⁴⁶ Inventory Report 1976 for Resource Community Development, Appendix, p. A9-10; Nickels, Appendix B, Table 8-12; Matthiasson (1970), p. 14.

⁴⁷ Matthiasson (1970), p. 12.

⁴⁸ Jackson and Poushinsky, p. 44; Matthiasson (1971), p. 32; Inventory Report 1976 for Resource Community Development, Appendix, p. A9-4.

⁴⁹ Inventory Report 1976 for Resource Community Development, Appendix, p. A9-10; Nickels and Kehoe, p. 23.

⁵⁰ Lucas, p. 204; Riffel, p. 25.

The natural and build physical environment including the town, its surroundings, and climate is of low importance to residents.⁵¹ It was also rated low in reasons for migration, as well as on lists of desired community improvements.⁵²

Safety in commuting to the work site is also considered of low importance to residents since aircraft would not fly under extremely hazardous conditions and personnel are more concerned with schedules than with risk.⁵³ This factor is unique to comparison of commuting communities so it is not reflected in other studies concerned with the family community.

Residents seem to attach a high level of importance to the family being together. This seems to be implied rather than stated in studies. Riffel suggests "the family may be of special significance" to residents.⁵⁴ Two questionnaire surveys which identified resident preferences for single status communities or family communities both showed over 90% of the respondents preferred the family community.⁵⁵

51 Inventory Report 1976 for Resource Community Development, Appendix, p. A-1.

52 Jackson and Poushinsky, p. 42-44; Nickels, Appendix B, Table 8-12.

53 International Surveys Ltd., p. 55; Charles W. Hobart, "Employee Adjustment and Effectiveness: Arctic Oil Explorations of Gulf Oil Canada 1973-74" Westrende Institute, Edmonton, Alberta, 1974, p. 17.

54 Riffel, p. 45.

55 Inventory Report 1976 for Resource Community Development, Appendix, p. A9-11; Questionnaire survey of military personnel at Canadian Forces Station Alert, N.W.T., August, 1977 by Major L.P. Richard and Captain I.D. McCreath, Air Command Headquarters, Winnipeg, Manitoba.

One may conclude that this reflects the residents' preferences for the family to be together rather than be separated for weeks or months. In a study of the intensity of stress caused by various life events, those involving close family members were rated highest in their effect on the respondents.⁵⁶ This again reflects the importance of family to people which is rated as high.

Interpersonal relationships is rated as being of moderate importance. The lack of social life and presence of friends and relatives is often of moderate importance in the reasons for migration.⁵⁷ Cram's study rated social needs as being of moderate to high importance.⁵⁸ These social needs included getting along with others, making friends and feeling of belonging.

Several studies have examined the importance of the social and political aspects of community development to the residents of single enterprise communities. The majority of studies rated the importance of community development as moderate while the minority rated it as being of low importance.⁵⁹ Consequently, a moderate rating will be used in the analysis for community development.

⁵⁶ Fox, p. 99-102.

⁵⁷ Jackson and Poushinsky, pp. 42-44; Nickels, Appendix B, Table 6-16.

⁵⁸ Cram, pp. 137, 139.

⁵⁹ Nickels and Kehoe, p. 23; Inventory Report 1976 for Resource Community Development, Appendix, pp. A9-10, A9-11; Proceedings of the Symposium on Resource Frontier Communities, p. 17.

3c. Factor Indicators and Ratings

The quality of life factors determined to be significant to single enterprise communities were the following: physical environment, isolation, safety, community development, interpersonal relationships, family, housing, recreation/entertainment, education, medical and goods and services. The goal for each factor is assumed to be the maximization of positive benefits such as maximizing the residents levels of choice or opportunity and maximizing positive impacts. The indicator for each factor will be the degree of choice, opportunity or positive impact of each factor as it affects the residents. Degree of choice is used since it is readily measurable on an ordinal scale and is independent of the residents' personality traits which affect the level of user satisfaction which is more difficult to measure.

Choice is considered to be the key in the analysis and comparison of quality of life factors. Lucas sees "freedom of choice" as "one of the crucial social characteristics that distinguishes the urban area from the small community".⁶⁰ Most complaints about single enterprise communities involve the problem of "lack of choice" which Bancroft considers as a crucial urban characteristic.⁶¹

Blumenfield also considers choice as the key element in the urban environment.

⁶⁰ Lucas, pp. 6, 7.

⁶¹ Bancroft, p. 8.

A wide range of mutual choice between employer and employee and between buyers and sellers is certainly the decisive criterion for the urban area as an economic machine, as a place for living. But it is hardly less important for the city as a place for living: a wide range of choice for location and type of residence, of shopping and consumer facilities, of educational, cultural and recreational opportunities, of medical services, of voluntary associations and last but not least, of personal contacts....Without accessibility, however, the mere existence of a wide range of choice within an urban area is only an empty promise.⁶²

With its restrictive social and physical environment, the isolated single enterprise community fails to provide its residents with a choice of facilities and opportunities. Porteous considers this choice as the essence of urbanity.⁶³ Lucas states:

the life round of the suburban family is amazingly similar to that of the family in the single industry community. The basic difference is that the urban resident has alternatives that are seldom used; the availability, whether used or not, affects social definitions which have a great importance to the individual and his attitudes. It is one thing to choose not to select certain alternatives and it is another not to be able to choose... The absent services seem to make the heart grow fonder. ⁶⁴

The single enterprise community, with its small population is unable to offer some urban opportunities, much less a choice. Residents must contend with limited professional, commercial, institutional services, and social and employment opportunities. Residents must either learn to live with most of these limitations or move to a larger community.⁶⁵

⁶² Blumenfeld, p. 3.

⁶³ Porteous (1975), p.8.

⁶⁴ Lucas, pp. 404-5.

⁶⁵ Lucas, p. 406.

For the short term community, the employee (on his days off) and his family can choose whether or not to make use of the services and opportunities which a large urban centre normally affords. While at the work site, the employee has a very limited choice of activities to pursue during his leisure time. However, the family remains in an urban setting with its range of choices.

For the long term community, the employee spends at most only a few months per year at home with his family. Although the family will be able to exercise its choice of activities all year round, the employee will be limited to an environment where choice is extremely restricted.

3c1. Physical Environment. Physical environment will be compared using the degree of desirability by the residents. The function of the built environment such as goods and services in an urban environment, is not included since it is described elsewhere in this chapter. Thus a natural physical environment with trees, lakes, etc. would be rated highly desirable, while a built environment with noise and pollution such as in large urban centres would have a very limited desirability. A harsh, cold, barren physical environment would be rated as very limited.

3c2. Isolation. Isolation will be compared using the degree of choice one has in selecting modes of transportation and communication. Urban residents would have a wide choice. Small communities, distant from the regional centre but with road access, would be classed as providing a limited choice. Communities without road access would provide very limited choice since residents cannot leave when they choose. Residents at the single status communities would have travel

constraints imposed on them as a condition of employment which further restricts choices for transportation. Communication systems would be similar to those of the family community and be generally unaffected by employment conditions. Due to the access to urban transportation facilities provided on alternate weeks, the short term commuter could be classed as having a limited choice. The long term commuter would have access to urban transportation facilities every seventh month. He can be classed as having a negligible choice due to his prolonged stay at the work site.

3c3. Safety. The indicator for safety will be assumed as the degree of safety from travel hazards in commuting to work or other activities. The employee in the family community travels daily to and from the work site by vehicle, usually for short periods of time and with small volumes of traffic on the road. The degree of safety in this case is high. The safety of the short term commuter travelling weekly by aircraft would be classed as very limited. The long term commuter makes only two flights in a six month period. Since the work site would probably be within walking distance of his living accommodation his degree of safety would be rated as high. Families are also exposed to risk in commuting to educational, shopping or recreational facilities. The family in the family community would be exposed to very little traffic and would generally fly out of the community once a year for holidays. This would be classed as a high degree of safety. For the families in the regional centre who are exposed to more traffic, the exposure to travel risk is higher and their safety can be classed as limited.

3c4. Community Development. The major employer has an effect on the future of the community, local government, and the social life and employment of the residents, which may be considered undesirable for community development. As a result, the degree of independence the residents have from the major employer's decisions is assumed as the indicator for the factor of community development. To take an extreme case, if the major employer decided to suspend operations, it would have a wide effect on the family community causing in many families to move out of the community.

For the single status communities, the employee and the family are in two different locations so they have different degrees of independence from the effect of decisions of the single major employer. If the major employer decided to suspend operations, the effect on the family in the regional centre would not be as severe as that for the family community. There would probably be a temporary loss of income, but there would be little reason for the whole family to relocate to another community if alternate employment could be found in the regional centre or another single status community. The regional centre would continue to function as if almost nothing had happened. Thus the family would have a limited degree of independence from the decisions of the major employer. However, the single status community would become vacant with few or no residents and the employees would be without work. Therefore, the employee is considered to have a negligible degree of independence from decisions of the major employer.

3c5. Interpersonal Relationships. The opportunities for interpersonal relationships can be measured using two important subfactors or

indicators: the portion of the population a resident knows and the diversity of the population. Other subfactors could possibly be added but only these two key subfactors will be used in the evaluation. These two indicators are assumed to be of equal value so the relative weight for either indicator will be half of the relative weight for the factor of interpersonal relationships.

Interpersonal relationships can be measured by the portion of the population that a resident knows at the acquaintance level. This portion also reflects the level of observability for social control and social conflict since this observability is usually meaningless for strangers. In the family community residents would know a wide number of residents. However, in the regional centre with its much larger population, it is difficult to have an acquaintance knowledge of more than a very limited portion of the residents. In the single status communities, employees would have an acquaintance knowledge of each resident after a short period of time. Although the short term commuter would know more residents in the regional centre than the long term commuter, he would have little opportunity to get acquainted with employees on alternate shifts at the work site.⁶⁶ As a result, the short term and long term commuters are both rated as knowing a wide (large) portion of the residents.

The second measurement is added to reflect the degree of diversity of the population with which residents may come in contact with. Generally, the family community would have a limited degree of diversity due to a lack of elderly people, single adult females and teenagers.⁶⁷

⁶⁶ "Shuttle Service for Workers", Regina Leader Post, September 4, 1976.

⁶⁷ Linn and Stabler, p. 2-3.

The regional centre would have a wide degree of diversity. The single status communities would be predominantly male without any children or elderly persons. Since the short term commuter is in an urban setting on alternate weeks, his degree of diversity of contact can be considered as limited. Due to his prolonged absence from an urban area, the long term commuter would be classed as having a negligible diversity of contact with people.

3c6. Family. Separation of one spouse from the family is generally considered undesirable.⁶⁸ Using the degree of opportunity the community affords the family to interact and be together, the family community would be rated high. The short term community would provide limited opportunity while the long term community would provide very limited opportunities for family interaction.

3c7. Housing. To compare housing, the choice of available housing will be used. The most recent single enterprise communities such as Fermont, P.Q. and Leaf Rapids, Manitoba provide a choice of single family, duplex, townhouse, apartment units and mobile homes which are also the basic types to be found in larger urban regional centres. Due to the small number of units, there is a limited choice in size, style, floor plans and location. With low vacancy rates there is often a waiting period for certain housing types.⁶⁹ In a larger regional centre, there would be a wider choice of housing types in various locations or settings. As well, there would be older, less expensive

⁶⁸ International Surveys Limited, pp. 16, 17.

⁶⁹ Linn and Stabler, p. 5-33.

dwellings. As a result, the family community is classed as having a limited choice of housing while the regional centre would offer a wide choice. The single status employees would have a negligible choice at the work site since single accommodation is of the same nature for both community types.

3c8. Recreation/Entertainment. For recreation/entertainment, the degree of choice residents have for recreation and entertainment activities will be used. Although facilities may be present for recreation and entertainment activities, residents are usually limited to one facility for any activity, particularly for entertainment such as dining, dancing and movies. The degree of choice of recreation/entertainment activities in the family community is rated as limited. The regional centre with more choice would be rated as providing a wide degree of choice. The short term commuter would have a limited choice since he spends alternate weeks in the regional centre. The long term commuter would have a very limited choice due to the small number of facilities and organizations as well as his prolonged periods of absence from the regional centre.

3c9. Education. Using the degree of choice of available educational services as an indicator, the regional centre would be rated as providing a wide choice. The school in the family community would be comparable to a neighbourhood school in the regional centre, and thus offer a limited or very limited choice of educational programs depending on the size of the community. Personnel at the single status communities have no opportunity to take self-development courses at the site unless they do so by correspondence. Thus the long term community is rated as

providing a negligible degree of choice. Although the short term commuter would be in the regional centre on alternate weeks, courses are usually offered on a weekly schedule so the commuter would miss half the classes in the course. Consequently, the educational choice available to the short term commuter is rated as very limited.

3c10. Medical. For medical services, the choice or range of available services will be used as an indicator. The employee's family living in the regional centre would have a wide range of medical and dental services including specialist skills and equipment. The medical services of the single status communities can be classed as very limited. Since the short term commuter would have access to full medical services on alternate weeks, his overall opportunity to utilize these services is rated as limited. The family community, with usually a single doctor and a small medical facility and staff, would be rated as limited.

3c11. Goods and Services. To compare goods and services, the degree of choice available to the residents will be used. Due to its small population, the family community cannot offer the wide variety of goods and services normally expected of the urban area. Since most of the goods and services are available from only one supplier in each case, the consumer faces a monopolistic situation for obtaining most goods and services in the family community. Thus the consumer can only compare prices in relation to southern stores, not other local stores. This deprives consumers of an entertainment and/or status fulfilling function normally enjoyed when a wide number of consumer choices are

available such as in an urban setting.⁷⁰ As a result, the availability of goods and services in the family community can be classed as limited due to the monopolistic supplier situation.

For the single status communities, the family living in the regional centre would have a wide range of choice for goods and services. The short term commuter would have limited choice since he can only exercise this choice on alternative weeks. The long term commuter is restricted to the extremely limited goods available at the work site. Since he has access to urban goods and services only once every six months, his overall choice can be classed as negligible.

4. Conclusion

The following table summarizes the quality of life factors selected by the author for use in the evaluation. The relative weight or importance of each factor is also shown as follows: high (3); moderate (2); and low (1). The indicator used to measure the level of choice, opportunity or positive impact of each factor as it affects the residents is also listed.

⁷⁰ Lucas, p. 233; Inventory Report 1976 for Resource Community Development, p. 9-23.

Table 4: Quality of Life Factor Summary

<u>Factor</u>	<u>Relative Weight</u>	<u>Indicator</u>
Physcial Environment	1	Degree of desirability.
Isolation	3	Degree of choice one has in selecting modes of transportation and communication.
Safety	1	Degree of safety from travel hazards in commuting to work or other activities.
Community Development	2	Degree of independence of residents from major employer's decisions.
Interpersonal Relationships	2	Portion of population a resident is acquainted with and degree of diversity of population with which a resident comes in contact with. (Both indicators considered of equal value).
Family	3	Degree of opportunity the community affords the family to interact and be together.
Housing	3	Degree of choice of available housing.
Recreation/ Entertainment	3	Degree of choice for recreation and entertainment activities.
Education	2	Degree of choice of available educational activities.
Medical	2	Degree of choice of medical and dental services.
Goods and Services	2	Degree of choice of goods and services.

It is conceded that a more elaborate scoring method could be applied to the quality of life factors to reflect expectations, ideals and previous experiences of the potential residents.⁷¹ This would require the gathering of more elaborate information which would not add to the illustration of the thesis methodology. A similar case applies to dividing factors such as physical environment into subfactors such as climate, land and environmental amenities. These subfactors could be readily handled due to the nature of the methodology but this will not be illustrated in this thesis. The indicators used in the methodology can be improved upon depending on the expertise of the planning team involved and the detail of data desired for the evaluation of the alternative community types. The following chapter will illustrate how the economic and quality of life factors described in this chapter are used in the methodology.

⁷¹ Jackson and Poushinsky, pp. 14, 15.

Chapter 3

APPLICATION OF METHODOLOGY

1. Introduction

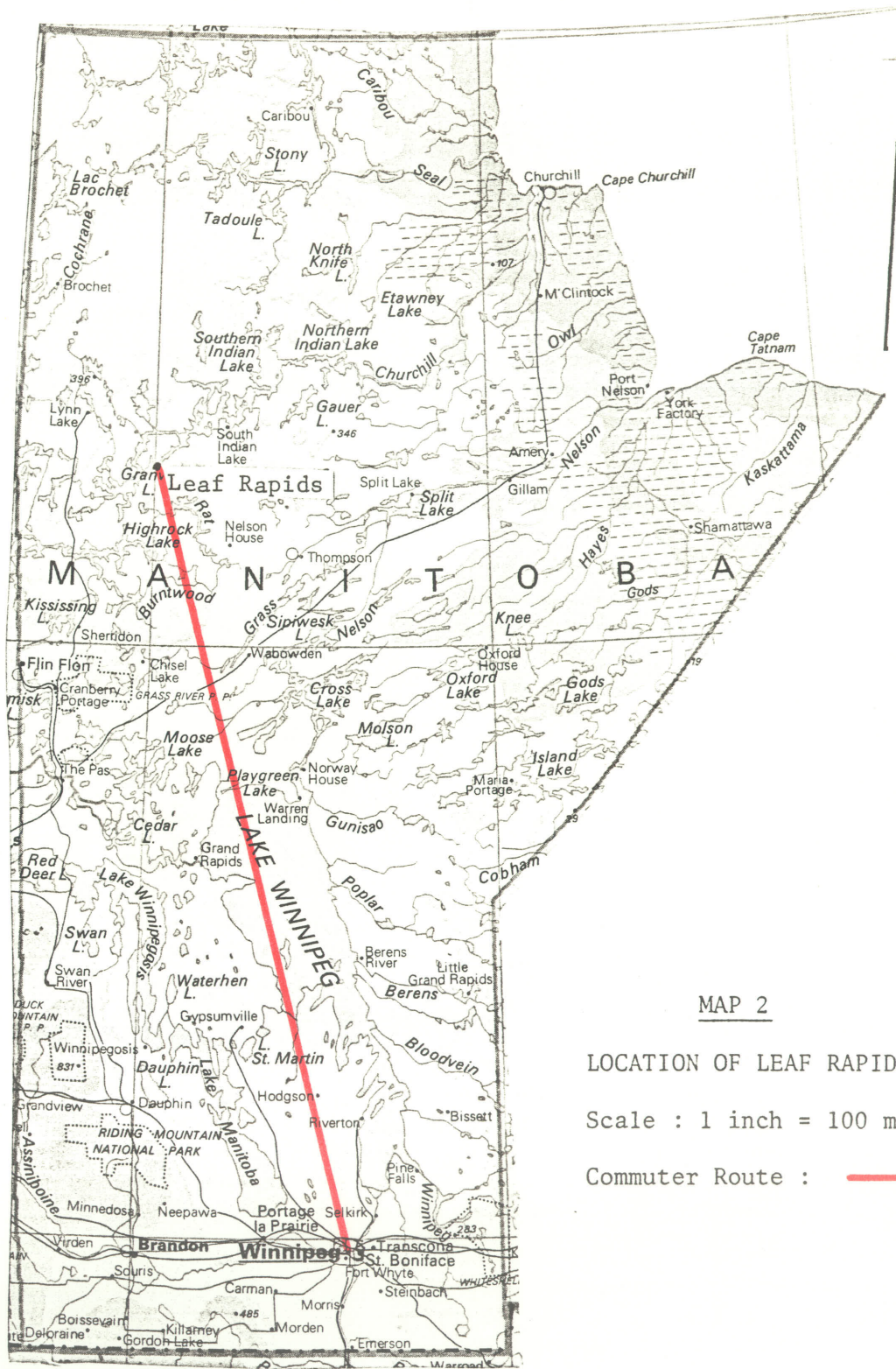
The purpose of this chapter is to test the feasibility of applying the methodology by using three case studies. The methodology described in chapter 1 and the economic and quality of life factors described in chapter 2 will be applied to an existing example of each community type to determine which of the three community types (the form) would have achieved the highest degree of fit with the site, residents, and major employer (the context).

The family community selected was Leaf Rapids, Man., a mining community. Rabbit Lake, Sask., another mining community, was selected as the short term community. For the long term community, a defence establishment, the DEW Line site at Hall Beach, N.W.T., was selected.

For each community, a scenario for the two alternative community types will be developed. For the quality of life analysis, it is assumed that the community or scenario communities have been in operation for several years so the construction of facilities is completed, services are well established, and the population is reasonably stable. Each community type will be evaluated using the economic and quality of life factors previously identified. The ratings and evaluation of each factor for each case study are based on the author's assessment of literature research. The resulting evaluation will produce an order of preference for the three community types for each case study.

CASE STUDY I: LEAF RAPIDS

Leaf Rapids is a mining community with a population of about 2,200 and is located approximately 550 miles north of Winnipeg (Map 2). The



MAP 2

LOCATION OF LEAF RAPIDS

Scale : 1 inch = 100 miles

Commuter Route : —

major employer is Sherrit Gordon Mines Ltd. which mines copper and zinc at the nearby Ruttan Lake Mine. The town is a family community and has a variety of housing types. It also has a town centre complex which accommodates schools, recreation facilities, retail stores, a hotel, hospital offices and other community services in one enclosed facility. Appendix C provides a list of facilities and services in Leaf Rapids.

In the scenario for the two single status communities it will be assumed that Winnipeg will serve as the regional centre where the employee's family will be accommodated. Winnipeg, with its population of over half a million has a wide range of urban services and activities. The single status communities would be located near the mine site. The economic and quality of life factors for each of the three community types will be briefly described and assessed in the following sub-sections. To facilitate comparison, the three community types are described under factors rather than community type.

2. Economic Analysis

To assess the economic factors, the population of the alternative communities must be estimated. This can be done by determining the work-force necessary for each community type and calculating the design population. With this information as a base, estimates can be made for the capital and operating costs of each community type.

2a. Design Population. Leaf Rapids' population in 1976 consisted of 2,100 persons in town and 100 single persons at the mine site. Approximately 600 persons are employed in the mining industry while about 300 are employed in other sectors of the community.¹

1

Manitoba Community Reports, Government of Manitoba,
Industry and Commerce, Winnipeg, Manitoba, September, 1976

For the short term community it is assumed the work force will work an 11 hour day, seven day week followed by seven days off instead of working the normal $37\frac{1}{2}$ hour week as in the family community. With this change in shift schedule, the on-site work force would require 263 employees. Another 263 workers would be the replacement shift and 60 employees would be administrative and logistics staff whose function can be performed at the regional centre from which the workers commute. This distribution of personnel is based on the Gulf Minerals mining operation at Rabbit Lake, Sask.² The percentages would vary with the nature of the single enterprise and should be calculated for each situation. Since there is no hotel, accommodation must be provided for transient personnel such as maintenance workers, inspectors, construction personnel and design and management staff. It is assumed that this would increase the design population by about 20 to 283 personnel.

For the long term community, it is assumed the work force will be employed on a 10 hour day 6 day week work schedule for six months followed by a one month paid holiday. It is assumed 60 persons will be employed in the regional centre as in the short term commuting community. To provide the same number of production hours as the family community, 338 workers are required at the mine site. To replace the workers on their one month holiday another 56 employees are required. The maximum number of transient personnel expected at any one time is assumed to be 25. This

2

Personal correspondence from F.R. Nogas, Manager, Human Resources, Gulf Minerals Canada Ltd., Toronto, Ontario, 28 June 1978.

gives a design population of 363 for the community. Ideally, rooms for the 56 shift replacement personnel should be provided so each worker can return to his personal room after his one month vacation.³ However, the cost of almost \$800,000 for an extra 56 rooms makes this an expensive luxury, and will not be included in the capital cost estimates. Also if the turnover rate is 17% or more, enough rooms would become vacant for new employees to enable personnel to return to their "personal" room after their holiday.

2b. Capital Costs. Leaf Rapids presently accommodates 2,100 people in town plus 100 single persons at the mine site. Costs of facilities are listed below in 1978 dollars. These were obtained by adding 20% for inflation to 1976 costs.⁴ The municipal costs were reduced to reflect the requirements of a population of 2,200 instead of Leaf Rapids' original design population of 3,500.

	Cost (\$million)
Residential - 196 single family, 136 duplex 119 townhouses, 3-24 unit apartments, 35 unit mobile home park	25.20
Municipal - roads, water sewage, municipal buildings, fire & safety, medical/nursing, school, recreational	13.00
Commercial buildings & service industry structures	18.60
Single employee facilities - 100 motel type units	1.94
Dining/Kitchen (3,000 sq. ft.)	
Recreation (500 sq. ft.)	
Total	58.74

3

Noakes, p. 56.

4

From January 1976 to December 1977 the non-residential construction price index rose 21.4% and the residential construction price index rose 18.3%. Canadian Statistical Review, January 1978, vol. 53, no. 1, Statistics Canada, p. 67.

The number of family and single employee residences are greater than the number of employees of the major enterprise to accommodate employees in the service industry, teachers and medical staff who do not work for the major employer. In contrast to the other two community types, the major employer would probably not pay 100% of this capital cost. In Leaf Rapids, the resource company paid about 30% of the municipal costs with the remainder paid by private business and various levels of government and their agencies.⁵ This results in the major employer being responsible for \$3.9 million of the capital municipal costs. In addition, the company has \$2.6 million invested in interest-free second mortgages.⁶ Including the single employee facilities, the major employer would have a total capital investment of \$8.2 million. It must be realized that different cost sharing agreements and different levels of services and amenities could greatly alter this figure.

The short term community would have a design population of 283. Capital costs were obtained by calculating area requirements and using 1977 unit costs plus 10% for inflation.⁷

	Cost (\$million)
Single Employee Facilities -	5.09
283 motel type units	
Dining/Kitchen (9,000 sq. ft.)	
Recreation (5,000 sq. ft.)	
Municipal - roads, water sewage, etc.	.50
Total	5.59

⁵
Inventory Report 1976 for Resource Community Development
p. 4-19.

⁶
Ibid, p. 4-18.

⁷
1975 Dodge Construction Systems Costs, McGraw Hill
Information Systems, New York, 1974, pp. 164-209;
Building Construction Cost Data, 1977, 35th ed.
Robert Snow Means Co. Inc., Duxbury Mass., 1976, pp.
241-271.

The long term community would have a design population of 363.

	<u>Cost</u> <u>(\$million)</u>
Single Employee Facilities -	7.52
363 motel type units	
Dining/Kitchen (12,000 sq. ft.)	
Recreation (18,000 sq. ft.)	
Municipal - roads, water, sewage	<u>1.00</u>
Total	<u>8.52</u>

To analyze the capital costs together with the operating costs, the capital costs will be amortized at 10% interest compounded yearly for a period of 20 years. The ore reserves initially permitted 18 years of operation with an additional 9 years expected, so the town's expected life is over 20 years.⁸ The amortized costs are shown in Table 5 : Leaf Rapids-Economic Summary.

2c. Operating Costs. The operating costs were described in general in chapter 2. Since the major employer isn't directly responsible for the provision of municipal services in the family community, it must pay its share of municipal taxes for these services. In Leaf Rapids, the major employer's municipal taxes are estimated at \$1.32 million.⁹ For the single status communities, it is assumed the major employer would pay about \$50,000 for municipal taxes in the regional centre.

The operating and maintenance costs of buildings and facilities are shown in the economic summary table and are based on 8½% of capital costs.

8

Inventory Report 1976 for Resource Community Development
p. 4-15.

9

Ibid, pp. 4-20, 4-21 plus 20% inflation.

For the family community, the cost to commute from the residence to the work site would be negligible since workers could use their own cars or walk, depending on the distance or the major employer could perhaps provide a bus service. For the short term community, the 263 workers on site plus transient personnel could be rotated using tri-weekly flights with an aircraft such as the Boeing 737 at an estimated cost of \$894,000 annually. Flying time would be just over one hour. For the long term community, it is assumed the workers would rotate using a bi-weekly aircraft. With 56 workers plus transients per month to be transported, a Fairchild F27 or YS-11 aircraft twice per month would suffice, at an estimated cost of \$59,000 annually. Flying time would be under 2 hours. Less frequent flights with larger aircraft could rotate personnel just as well, but there are usually unforeseen circumstances which make it desirable to have a bi-weekly flight to the community.

The cost of meals for the single status employees only is shown in the economic summary table. This cost excludes kitchen staff and facilities which are included under employee salaries and capital costs. For the employees in the family community, the major employer will often provide assistance programs to recruit and retain employees. The company provides housing assistance in the form of rental or purchase subsidies amounting to \$240,000 annually.¹⁰ As annual vacation bonus of \$200 per single employee and \$400 for employees with families in Leaf Rapids is assumed to be provided to help defray vacation expenses.¹¹ Housing assistance and vacation bonuses are not applicable for the single status communities

¹⁰ Ibid, p. 4-23.

¹¹ Based on \$186 return air fare from Lynn Lake to Winnipeg; Transair ticket office, Winnipeg, 11 April, 1978.

for the reasons outlined earlier in chapter 2.

The average annual cost of wages and normal fringe benefits (excluding housing, vacation, meals) of mine employees in the family community is estimated at \$20,000 per employee.¹² For the single status communities wage costs are adjusted for the on site workers due to differences in average weekly working hours plus overtime for hours worked above 40 per week and include holiday pay. The wage costs for the employees in the regional centre are estimated at \$20,000 annually. The results are shown in the economic summary table.

Turnover costs are assumed to be \$1,400 per employee, which is the average turnover costs previously identified for the mining industry. This applies for all three community types. For the family community an average allowance of \$1,000 per employee must be added for relocation assistance for new employees.¹³ Turnover rates at all three community types are assumed to be the same at 20% per annum since work related factors rather than community factors are the major reason for labour turnover. This gives a turnover cost of \$160,000 per year for the short term community; \$130,000 for the long term community and \$290,000 for the family community. Although this cost is minor in relation to the other economic costs, the effects of high turnover rates on employee productivity is adverse and could hinder or even temporarily halt production in an extreme case.

12

Inventory Report 1976 for Resource Community Development,
p. 4-23 plus 20% inflation.

13

United Van Lines estimated \$1,200 to move 5,000 lbs. of furniture and household goods from Winnipeg to Leaf Rapids, 12 April, 1978.

The population data and capital and operating costs calculated for the economic factors previously discussed are summarized in Table 5. All costs are in millions of 1978 dollars.

Table 5 : Leaf Rapids - Economic Summary

Community Type	<u>Family</u>	<u>Short Term</u>	<u>Long Term</u>
<u>Population Data</u>			
Total Employees	600	586	454
Site Work Force	600	263	338
Design Population	2,200	283	363
<u>Costs (millions of \$1978)</u>			
Capital	8.20	5.59	8.52
Amortization	0.96	0.66	1.00
Municipal Taxes	1.32	0.05	0.05
Facilities Operation & Maintenance	0.17	0.48	0.72
Air Commute	-	0.89	0.06
Meals	0.22	0.61	0.77
Housing Assistance	0.24	-	-
Vacation Bonus	0.22	-	-
Employees Salaries	12.00	12.00	13.39
Turnover Costs	<u>0.29</u>	<u>0.16</u>	<u>0.13</u>
Total Annual Costs	15.42	14.85	16.12

3. Quality of Life Analysis

Based on the quality of life factors and social indicators previously discussed, each community type will be evaluated and rated to determine its quality of life index. For illustration purposes, the importance and rating given to each factor will be assumed to be those given in chapter 2. The degree of choice, desirability or positive impact is rated on an

ordinal scale as follows: high or wide (W)=4; limited (L)=3; very limited (VL)=2; and negligible or nil (N)=1. The ratings assigned to the factors are the author's classification based on a literature review. In an actual study, these should be identified from a survey of expected user/residents. After the discussion of all quality of life factors, the relative weight and ratings given to each factor for each community type will be summarized in the quality of life matrix.

3a. Site Factors. Leaf Rapids, located in a forested area with nearby waterways, provides a park setting, with almost instant access to nature or wilderness. Fresh, clean air is abundant. The climate is more severe than Winnipeg with a longer period of cold weather. However, the snowfall is slightly less.¹⁴ Winnipeg provides an urban environment with its artificial and limited use structures. The high volumes of traffic produce congestion, noise and air pollution. Noise and air pollution are further increased by the concentration of industrial activities in the city. Green or open spaces are limited. Thus, as a physical environment, Leaf Rapids is classed as most desirable, while Winnipeg would have very limited desirability.¹⁵

Since Leaf Rapids is connected by highway to Thompson and thence to Winnipeg, it is rated as providing a limited choice in the selection of modes of transportation and communication. Winnipeg, being a large urban centre would have a wide choice. For the single status communities, it is assumed the highway from Thompson would not have been

¹⁴ Climatic Information for Building Design in Canada
1965, National Research Council, Ottawa, Canada, p.35.

¹⁵ Gertler and Crowley, p. 362; Riffel, p. 22.

built since the railroad would be adequate for the movement of goods. The short term commuter would have a limited choice of modes since he would be in Winnipeg on alternate weeks. The long term commuter would have a negligible choice since he would be able to fly out once in six months and have little or no choice in communication modes.

Due to low volumes of traffic and infrequent flights from Leaf Rapids, the family community provides the residents with a high degree of safety in travelling. The short term commuter has a very limited degree of safety due to the weekly flights. Since the long term commuter flies in and out of the community once every six months, his travel safety is rated as high. The family in Winnipeg is rated as having a limited degree of travel safety due to the high volumes of traffic.

3b. Resident Factors. The family and single status communities have a negligible degree of independence from the decisions of the major employer since the existence of the community is solely dependent upon the major employer. The family in the regional centre would have a limited degree of independence due to the economic diversity found in Winnipeg in comparison to Leaf Rapids.

The factor of interpersonal relationships utilizes two indicators which are assumed to be of equal importance. Since the factor has a relative weight of two, the rating for the indicators can be simply added together to get the overall rating for the factor itself. This eliminates the requirement to multiply the social indicator rating by the relative weight for this factor. The family community would provide a limited diversity of population but the residents would usually know a wide number of residents. In the regional centre the employee's family would be exposed to a wide diversity of population but would know only

a very limited portion of the population. The employee in the single status community is rated as knowing a wide number of people. The short term commuter would be exposed to an overall limited diversity of people due to his alternate weeks in Winnipeg. The long term commuter who only gets to Winnipeg every six months is rated as being exposed to a very limited diversity of population.

The family community provides the family with opportunities to interact on a daily basis and is rated high. The short term community provides this opportunity only on alternate weeks so it is rated as limited. Since the long term community provides this opportunity only every six months, it is rated as very limited.

3c. Community Factors. Housing, recreation/entertainment, education, medical and goods and services are factors which are all a function of population size for the family community. With a population of over 2,000, Leaf Rapids is reasonably well endowed with respect to these factors. As a result, it is rated as providing a limited degree of choice for these factors. An exception is the employee's education which is rated as very limited since adult educational courses are very limited in a community of 2,000. For the single status community types, Winnipeg, the regional centre, would provide a wide degree of choice for the employee's family. The short term commuter would have a limited choice for recreation/entertainment, medical and goods and services due to his access to the regional centre on alternate weeks. Due to difficulties encountered in taking educational courses on alternate weeks, the short term commuter's choice for education is rated as very limited. Housing choice for both the short and long term commuter is rated as negligible since the major employer would provide only motel or dormitory

type accommodation. Due to the presence of medical and recreation facilities at the work site, the long term commuter is rated as having a very limited degree of choice with respect to these two factors. Educational facilities are non-existent so the degree of choice is rated as nil. Goods and services would be very basic and provide little or no choice.

The following quality of life matrix summarizes the ratings given by the author for each factor and its relative weight. For each factor the degree of choice, desirability or impact is rated on an ordinal scale as follows: wide or high (W)=4; limited (L)=3; very limited (VL)=2; and negligible or nil (N)=1. These numerical ratings are multiplied by the relative weight for each factor and the result is shown below the degree rating in the matrix. These results are added together for the employee and the family for each community type. The totals for the employee and the family are then added together to produce the "quality of life" index for each community type.

Table 6: Leaf Rapids - Quality of Life Matrix

Quality of Life Factor	Community Type						
	Relative Weight	Family		Short Term		Long Term	
		E	F	E	F	E	F
Physical Environment (degree of desirability)	1	W 4	W 4	W 4	VL 2	W 4	VL 2
Isolation (choice of transportation & communication modes)	3	L 9	L 9	L 9	W 12	N 3	W 12
Safety (degree of travel safety)	1	W 4	W 4	VL 2	L 3	W 4	L 3
Community Development (degree of independence from major employer decisions)	2	N 2	N 2	N 2	L 6	N 2	L 6
Interpersonal Relationships (portion of population as acquaintances)	2 (1)	W 4	W 4	W 4	VL 2	W 4	VL 2
(population diversity)	(1)	L 3	L 3	L 3	W 4	N 1	W 4
Family Unit (opportunity to interact together)	3	W 12	W 12	L 9	L 9	VL 6	VL 6
Housing (choice)	3	L 9	L 9	N 3	W 12	N 3	W 12
Recreation/Entertainment (choice)	3	L 9	L 9	L 9	W 12	VL 6	W 12
Educational (choice)	2	VL 4	L 6	VL 4	W 8	N 2	W 8
Medical (choice)	2	L 6	L 6	L 6	W 8	VL 4	W 8
Goods & Services (choice)	2	L 6	L 6	L 6	W 8	N 2	W 8
Totals		72	74	61	86	41	83
Quality of Life Index		146		147		124	

Legend: Employee (E); Family (F)

Desirability or Impact	Symbol	Value
Wide/High	W	4
Limited	L	3
Very Limited	VL	2
Negligible/Nil	N	1

4. Decision Evaluation

Tables 5 and 6 provide a summary of the analyses of economic and quality of life factors which were based on the author's analysis of literature data and subsequent judgement and evaluation in the context of Leaf Rapids. From these tables, the capital costs, the total annual cost and the quality of life index can be obtained and combined into Table 7, the analysis summary.

Table 7: Leaf Rapids - Analysis Summary

	<u>Community Type</u>		
	<u>Family</u>	<u>Short Term</u>	<u>Long Term</u>
Capital Cost (\$Million)	8.20	5.59	8.52
Annual Costs (\$Million) (including amortized captial)	15.42	14.85	16.12
Quality of Life Index	146	147	124

This table enables planners to readily examine the order of preference of the three community types.

The short term community has the lowest capital cost, the lowest annual costs and the highest level of resident goal satisfaction. The family community is rated second in desirability since its capital cost and annual costs are slightly higher than those of the short term community and the goal satisfaction level of the residents is slightly lower. The long term community is the least desirable since it is the most costly and provides the lowest level of goal satisfaction.

From the analysis it would appear that the decision to build a family community at Leaf Rapids was not the most reasonable choice since the short term community is both less costly and provides an overall higher quality of life index. The difference in annual costs is only \$570,000 or 3.6% of the family community annual costs. If the turnover rate for the family

community was lowered to say 10% and that of the short term community increased to 30% or even 40%, the family community's annual costs would still be higher. Thus, differences in turnover rates, unless extreme, would not affect the order of preference.

There is a possibility the residents of Leaf Rapids place an extremely high importance on the family being together and would rate the relative importance of the family factor at six instead of three. This would increase the family quality of life index to 170 and the short term's index to 165. Thus on a quality of life basis, the family community would be more desirable. The problem now becomes one of costs versus quality of life. Are the extra five points on the quality of life index worth the increase in annual expenditures of \$570,000? Here the planner would have to identify the risk involved based on the reliability of data. If turnover rates could be different for each community type, how does this affect costs? Would there be associated production losses and of what magnitude? What is the risk involved in attracting a labour force to each community type? Such differences were assumed not to exist for this analysis but could exist in reality.

There is an element of financial risk for the major employer if the market for copper and zinc becomes depressed and the company is forced to cease or drastically reduce operations. Such an incident occurred at Elliot Lake, Ontario. In addition to the mine facilities at Leaf Rapids, the major employer is financially responsible for some municipal and residential costs. The company was required to guarantee payment of municipal and school debentures.¹⁶ This, plus buy back clauses for employees'

¹⁶Inventory Report 1976 for Resource Community Development, p. 4-16.

residences, could result in the company being responsible for an additional \$25 to \$30 million above its plant cost.

The general manager for the Sherrit mine in Leaf Rapids has termed the community an economic mistake which cost too much and that others like it won't be built. He suggested an answer to accommodating mine workers could be the development of existing communities and flying workers to the new mine site.¹⁷ This would greatly reduce the company's financial liabilities if the mine shut down.

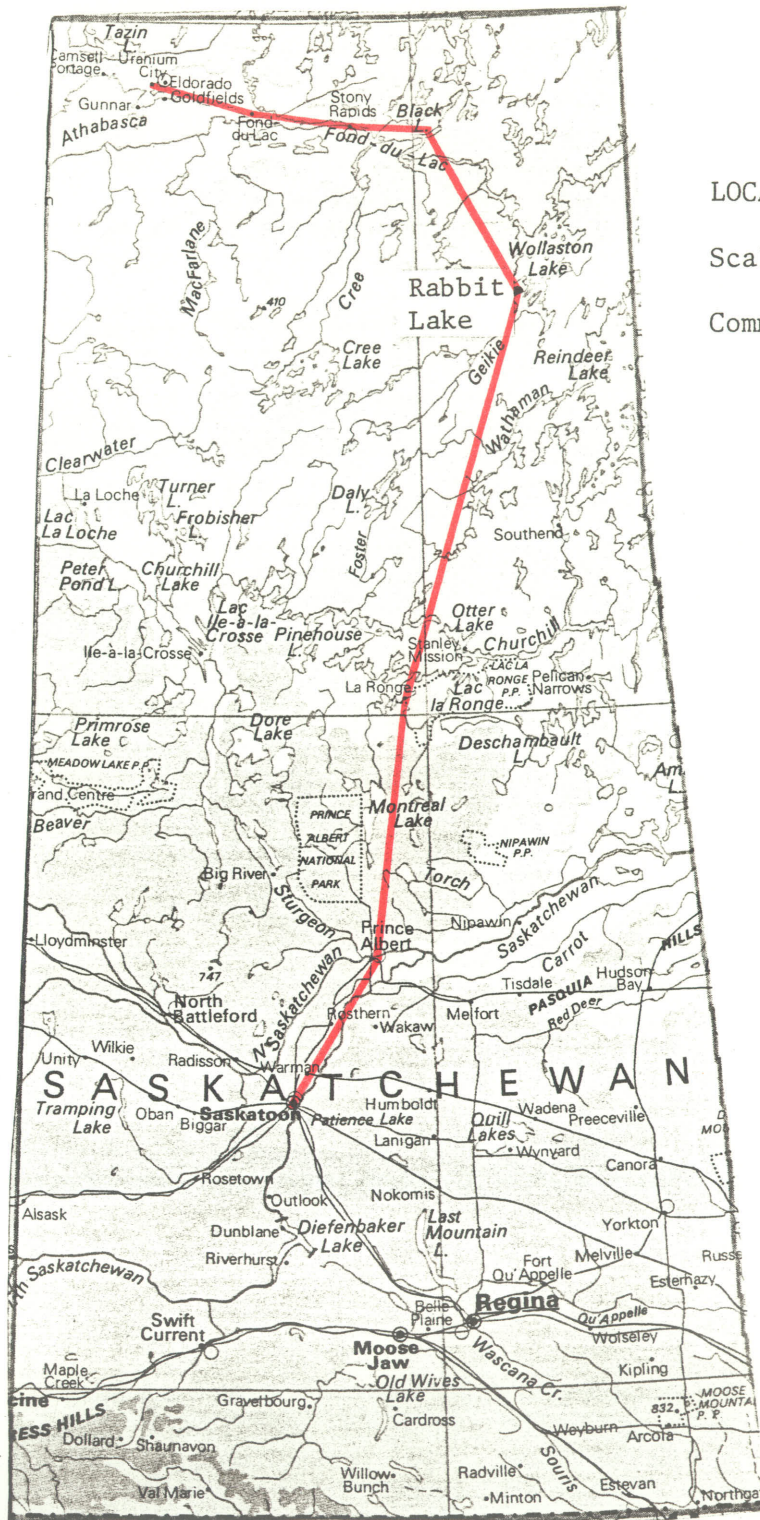
Based on the assumptions in the initial analysis plus a brief examination of financial risk, the decision to build a family community wasn't the best decision for either the company or the residents. The short term commuting community should have been the first choice.

CASE STUDY II : RABBIT LAKE

Rabbit Lake, Saskatchewan, is the site of a uranium mine and processing mill operated by Gulf Minerals Canada Limited. It is located 430 miles northeast of Saskatoon in the Wollaston Lake Region (Map 3). The work force employs 291 personnel with 25 being located in Saskatoon for administrative and logistics duties. The remaining employees are flown from their home community to Rabbit Lake where they work an 11 hour per day seven day shift before being flown home for a seven day rest. The majority of employees live in Saskatoon, Prince Albert, and La Ronge. The other employees, many of them native people live in the small northern communities of Stony Rapids, Black Lake, Fond du Lac, and Uranium City. Community populations are shown in Appendix D.

17

"Leaf Rapids called 'Silly Town' that's an Economic Mistake", Winnipeg Free Press, March 31, 1978, p. 15.



MAP 3

LOCATION OF RABBIT LAKE

Scale : 1 inch = 100 miles

Commuter Route : ———

Due to the confidentiality of information such as the feasibility studies for Rabbit Lake and the number of employed natives, some assumptions will be necessary in the analysis of Rabbit Lake.¹⁸ It is assumed that 246 of the 266 mine site employees come from Saskatoon, Prince Albert and La Ronge. This is based on the available flight information for the air commute.¹⁹

The estimated production life of the ore body is 10 to 12 years.²⁰ Other ore deposits have been found in the area but their extent is not yet known.²¹ As a result it is assumed there is sufficient ore in the surrounding area to provide for a minimum community life span of 20 years.

For the scenario of the alternative community types it is assumed Saskatoon will serve as the regional centre for the long term community. Sources of labour are assumed to be the same as those presently used for the Rabbit Lake operation. It is assumed the family community will be similar in proportion to Leaf Rapids.

5. Economic Analysis

5a. Design Population. The mining operation at Rabbit Lake requires a total of 291 employees of which 25 work in Saskatoon. 133 employees are required on site while 133 are on days off. A maximum of 12 transient personnel are assumed which results in a design population of 145.

18

Nogas (1978); Colin Scott, A Preliminary Evaluation of the Gulf Minerals Rabbit Lake Commute as Regards Native Northern Employment, "Occasional Paper #1, Dept. of Northern Saskatchewan, La Ronge, Saskatchewan", September, 1975.

19

Nogas (1978); Scott, p. 10.

20

Nogas (1976), p. 125.

21

Norah J. Allman "Gulf's Rabbit Lake Mine Exceeding Rated Capacity", Northern Miner, September 22, 1977.

For the family community it is assumed the employees work an average 37 hour week. To achieve the same number of productive hours as the short term commuting community, a total of 298 employees are required. Assuming the same proportion of employees to total population in Leaf Rapids, the family community should be designed for about 1,100 people.

For the long term community, it is assumed the employees work a 60 hour week which is the same as the long term community scenario for Leaf Rapids. However, it will be assumed the employees will have a one month holiday on a four instead of a six month interval. Calculations will also be shown for rotation at a six month interval to test the sensitivity of the economic factorw to changes in rotation periods. Regardless of the rotation period used, the mining operation will require 171 employees on site and 25 in Saskatoon. This will be used as the design population. For the six month rotation, 29 additional employees are required for shift replacement. This increases the total number of employees to 225. For the four month rotation, a shift replacement of 43 employees is required increasing the total employees to 239.

5b. Capital Costs. The capital costs for the family community were assumed to be proportional to those for Leaf Rapids and are shown below:

	Cost (\$million)
Residential - 280 units	12.60
Municipal	6.50
Commercial	9.30
Single employee facilities (50 persons)	0.98
- 50 motel type units	
- Dining/Kitchen (1,500 sq. ft.)	
- Recreation (500 sq. ft.)	
Total	29.38

Assuming the major employer pays the same percentage of the capital costs as in Leaf Rapids, the major employer's share would be \$4.13 million for Rabbit Lake.

The short term community's costs were estimated due to lack of information about actual costs.

	<u>Cost</u> <u>(\$million)</u>
Single Employee Facilities	2.62
- 145 motel type units	
- Dining/Kitchen (4,500 sq. ft.)	
- Recreation (2,500 sq. ft.)	
Municipal - roads, utilities	<u>0.30</u>
Total	2.92

The long term community costs are as follows:

	<u>Cost</u> <u>(\$million)</u>
Single Employee Facilities	4.29
- 185 motel type units	
- Dining/Kitchen (5,500 sq. ft.)	
- Recreation (12,000 sq. ft.)	
Municipal - roads, utilities	<u>0.30</u>
Total	4.59

The reduction in recreation facilities to a more meager level could reduce capital costs by about one million dollars. This would make the major employer's capital cost for the long term community lower than the family community. It would also lower the quality of life at the work site.

All capital cost will be amortized at 10% over a 20 year period and these costs are shown in the economic summary.

5c. Operating Costs. In the family community, the major employer would pay about \$660,000 in municipal taxes. For the single status communities it is assumed the major employer would pay \$30,000 in municipal taxes in the regional centre.

The operating and maintenance cost of buildings and facilities is based on $8\frac{1}{2}\%$ of the capital cost and is shown in the economic summary table.

The cost of commuting by air from Saskatoon to Rabbit Lake is assumed to be independent of the number of stops enroute. Thus the aircraft stops at Prince Albert and La Ronge enroute to Rabbit Lake do not add to the cost of travelling. It is assumed the cost of the 40 passenger Fairchild F-27 presently used at Rabbit Lake is the same as the cost of the YS-11. The short term community would require four F-27 flights per week from Saskatoon with stops at Prince Albert and La Ronge. Another flight using a small aircraft is required once per week to pick up about 10 workers located at Uranium City, Fond du Lac, Stony Rapids and Black Lake. This latter cost is estimated at 5 cents per passenger mile. Annual flying costs are estimated at \$410,000. Flying time from Saskatoon to Rabbit Lake is about two hours plus stop over time. For the long term community, it is assumed all employees will meet aircraft at either Saskatoon, Prince Albert or La Ronge. Annual commuting costs are estimated at about \$46,000 for the four month rotation of employees and at \$23,000 for the six month rotation.

The cost of meals, housing assistance, vacation bonus, employee salaries and turnover costs are estimated using the same rationale and unit costs as those for Leaf Rapids. The costs for employee salaries in the two long term communities are adjusted to reflect the different hours worked on an annual basis. It is assumed the holiday pay is based on hours worked and not on leave periods so the employee receives the same salary if he works the same hours but takes different amounts of holidays. Table 8 below summarizes the economic factors previously discussed.

Table 8: Rabbit Lake - Economic Summary

Community Type	<u>Family</u>	<u>Short Term</u>	<u>1/4 Long Term</u>	<u>1/6 Long Term</u>
<u>Population Data</u>				
Total Employees	298	291	239	225
Site Work Force	298	133	171	171
Design Population	1,100	145	175	175
<u>Costs (Millions of \$1978)</u>				
Capital	4.13	2.92	4.59	4.59
Amortization	0.49	0.34	0.54	0.54
Municipal Taxes	0.66	0.03	0.03	0.03
Facilities Operation & Maintenance	0.35	0.25	0.39	0.39
Air Commute	-	0.41	0.05	0.02
Meals	0.11	0.29	0.37	0.37
Housing Assistance	0.12	-	-	-
Vacation Bonus	0.11	-	-	-
Employees Salaries	5.96	5.96	6.78	6.69
Turnover Costs	<u>0.14</u>	<u>0.08</u>	<u>0.07</u>	<u>0.06</u>
Total Annual Costs	7.94	7.36	8.23	8.10

The economic analysis indicated the short term community was a clear preference since its annual costs were 7% lower than the next lowest community costs. The variation in rotation periods for the long term community resulted in the four month rotation being slightly more expensive (1.6%) than the six month rotation. Thus, the reduction in rotation period from six to four months doesn't appear to significantly affect costs or the order of preference in this case. The quality of life for the two long term rotation periods will not be compared since

the differences between the two would be slight in comparison to the family and short term communities and would not be distinguishable with the scale used in the quality of life analysis. However, it is recognized that the rotation of employees at four month intervals would provide an improvement in quality of life over the six month rotation.

6. Quality of Life Analysis

Since Rabbit Lake's workforce comes from different communities with varying populations, the employee and the family for the single status communities have different levels of goal satisfaction depending on the population and facilities of the home community. Ideally each community and the number of employees from each community should be identified and dealt within the quality of life matrix in the Rabbit Lake evaluation. This would result in 30 groups to be rated for each factor. If communities of similar size had similar facilities, the number of groups in the matrix could be reduced to 18. In each case, the final quality of life index for the single status communities would be the summation of the quality of life index for the family in each home community multiplied by the percentage of the labour force originating from each community, plus the work site quality of life index for the employee at the work site. Since the percentages of the labour force would have to be assumed for each community for illustration purposes, it is proposed instead to combine all the home communities and assume an average overall rating of limited rather than wide for most factors relating to community size. This results in the assessment of six groups in the matrix rather than the 18 or 36 previously mentioned. It avoids a complex matrix which would involve time-consuming mechanical operations and reduce the clarity of the illustration.

6a.Site Factors. The physical environment of Rabbit Lake is the same as that of Leaf Rapids so the ratings are identical. Rabbit Lake is connected by road to La Ronge and the rest of the national road network. Distances to large urban centres are also similiar to that for Leaf Rapids so isolation is rated the same. Safety is also rated the same as for Leaf Rapids.

6b.Resident Factors. Since Rabbit Lake is dependent upon mining like Leaf Rapids, community development is rated the same. For interpersonal relationships, the employee and family in the family community and the employees of the single status communities would be rated as having an acquaintance knowledge of a high portion of the population. The families in the regional centre would be rated as limited since the population of the home communities vary from 126,000 to 193 and only two of the seven communities have populations over 2,2000. For population diversity, Rabbit Lake would be rated the same as Leaf Rapids even though the home community populations are less than Winnipeg's. All of the home communities, except Uranium City, are older established communities which would have a wide diversity of people representing both sexes and most age groups. The family factor is rated the same as for Leaf Rapids due to similar circumstances.

6c.Community Factors. Some factors have been previously identified as a function of population. The family community with a population of about 1,100 would provide a very limited choice for housing, recreation/entertainment, education, medical, and goods and services. School in particular would probably offer education up to grade eight or nine with very little, if any, adult education courses. Housing would be mostly three to two bedroom dwellings for families. Medical services would

consist of two nurses plus a small infirmary. Commercial facilities would likely consist of a small shopping centre selling both groceries and dry goods.²² Recreation and entertainment facilities would be similiar to those for the long term community. The large home communities would have these facilities or better and would be rated as providing a wide or limited choice. However, three of the home communities have populations much less than the family community's and provide little or no choice with respect to these factors. As a result, an overall rating of limited will be used for the families of employees in the single status communities. The rating for the single status employees at Rabbit Lake is the same as that given for the Leaf Rapids single status communities. The short term commuter's choice is decreased but not enough to be judged one degree lower on the rating scale.

The following matrix summarizes the ratings given to the quality of life factors previously discussed. The mechanics of the matrix are the same as in the Leaf Rapids quality of life matrix.

²²International Surveys Limited, p. 9.

Table 9: Rabbit Lake - Quality of Life Matrix

Quality of Life Factor	Relative Weight	Community Type					
		Family		Short Term		Long Term	
		E	F	E	F	E	F
Physical Environment (degree of desirability)	1	W 4	W 4	W 4	VL 2	W 4	VL 2
Isolation (choice of transportation & communication modes)	3	L 9	L 9	L 9	W 12	N 3	W 12
Safety (degree of travel safety)	1	W 4	W 4	VL 2	L 3	W 4	L 3
Community Development (independence from major employer decisions)	2	N 2	N 2	N 2	L 6	N 2	L 6
Interpersonal Relationships (portion of population as acquaintances)	2 (1)	W 4	W 4	W 4	L 3	W 4	L 3
(population diversity)	(1)	L 3	L 3	L 3	W 4	N 1	W 4
Family Unit (opportunity to interact together)	3	W 12	W 12	L 9	L 9	VL 6	VL 6
Housing (choice)	3	VL 6	VL 6	N 3	L 9	N 3	L 9
Recreation/Entertainment (choice)	3	VL 6	VL 6	L 9	L 9	VL 6	L 9
Education (choice)	2	N 2	VL 4	VL 4	L 6	N 2	L 6
Medical (choice)	2	VL 4	VL 4	L 6	L 6	VL 4	L 6
Goods & Services (choice)	2	VL 4	VL 4	L 6	L 6	N 2	L 6
Totals		60	62	61	75	41	72
Quality of Life Index		122		136		113	

Legend: Employee (E); Family (F)

Degree of Choice, Desirability or Impact	Symbol	Value
Wide/High	W	4
Limited	L	3
Very Limited	VL	2
Negligible/Nil	N	1

7. Decision Evaluation

Tables 8 and 9 provide a summary of the author's evaluation of economic and quality of life factors for Rabbit Lake.

The results of these two analysis can be further combined into Table 10, the analysis summary.

Table 10: Rabbit Lake - Analysis Summary

	<u>Community Type</u>		
	<u>Family</u>	<u>Short Term</u>	<u>Long Term</u>
Capital Cost (\$ Million)	4.13	2.92	4.59
Annual Cost (\$ Million)	7.94	7.36	8.23
Quality of Life Index	122	136	113

The short term community is the most preferable community type since it is the most economical and provides the highest quality of life index. The family community is less desirable due to higher costs and a slightly lower quality of life index. The long term community is the least desirable since it has the highest annual costs and the lowest quality of life index.

The short term community's annual costs are \$580,000 lower than the family community's annual costs. Variations in turnover costs wouldn't alter the preference on a cost basis unless the family community's turnover rate was zero and the short term community's turnover rate was over 100%; an extremely improbable situation.

An assumption made in the quality of life analysis was the short term commuter's ratings for recreation/entertainment, education, medical and goods and services factors were the same as that for the Leaf Rapids short term commuter despite having a regional centre rated at limited instead of wide. Even if this assumption were wrong and the short term

commuter's rating decreased to the next lower level for these factors, the quality of life index for the short term community would be decreased to 127. This still makes the short term community the first choice for quality of life and the overall first choice. Thus the decision to build the short term community at Rabbit Lake was the best choice of the alternative community types.

CASE STUDY III : HALL BEACH

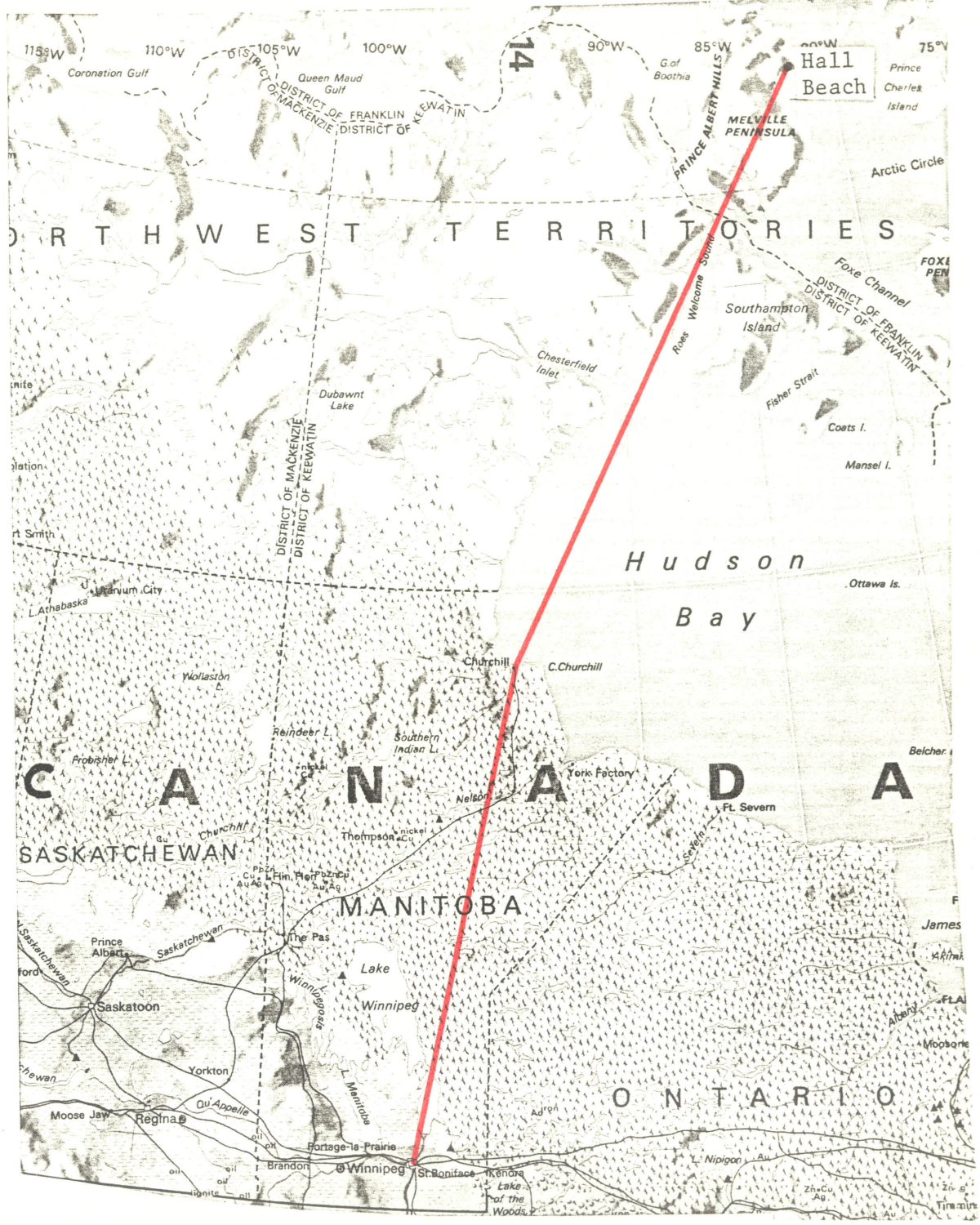
Hall Beach, N.W.T., one of the larger DEW Line sites, is a defence establishment located approximately 1,300 miles northeast of Winnipeg, Man. (Map 4). It was selected as the example of the long term community for several reasons. Firstly, there was no permanent settlement at the site prior to the construction of the DEW Line in 1953. The area had been used in the past by nomadic natives. Since construction of the DEW Line site, a permanent native settlement has grown a few miles away. A few of the natives are employed at the site while most natives are involved in hunting, fishing and crafts.²³ Secondly, the long term commuting approach is considered successful on the DEW Line. Managerial personnel cite a low turnover rate of about 10% which they attribute mainly to the high wages.²⁴ A third reason was to select a community which was involved in an activity other than mining namely defence. A long term community involved in mining which could have been examined is Marmorilik, Greenland. To

23

Donald G. Wood (ed), Canada North Almanac, vol. 2, Research Institute of Northern Canada, Yellowknife, N.W.T., January, 1976, p. 39.

24

In discussions with DEW Line management staff at Winnipeg, Hall Beach, Cape Dyer and Cambridge Bay, June 1977.



MAP 4

LOCATION OF HALL BEACH

Scale : 1 inch = 200 miles

Commuter Route : ———

evaluate this community would require a repetition of the extensive research already completed to determine quality of life factors and their values for a mix of Danish and Greenland citizens who work in Marmorilik.²⁵

The DEW Line site at Hall Beach is one of the northernmost part of a radar and communications net work designed as part of the North American Air Defence system. The site requires about 80 persons who work for a minimum six month period before taking one month's holiday. Personnel work nine hours a day six days a week. Non-management personnel are unionized and get paid time and a half after 40 hours. Winnipeg serves as the regional centre for all DEW Line sites in Canada. Rotation of all DEW Line personnel is done using a weekly Boeing 737 flight from Winnipeg to Hall Beach or Cambridge Bay from where personnel are flown to other sites using a smaller aircraft. The weekly flight from Winnipeg alternates between Hall Beach and Cambridge Bay, so Hall Beach gets only one direct flight every two weeks. Hall Beach is also accessible by sea for one month in the late summer which enables the transportation of non-perishable goods at a much lower cost than by air cargo.

In the scenario of the two alternative communities, it is assumed the short term community will also use Winnipeg as the regional centre. It is also assumed that all employees for the family community will be accommodated at Hall Beach and that there is no requirement to have logistic and administrative staff in Winnipeg. It is also assumed the family community would be served by a regional air carrier which would provide scheduled passenger and cargo service to the community.

25

Noakes, p. 54.

To evaluate the decision to build a long term community in its original context, it is assumed the native settlement does not exist. Since the site is part of a network of sites supported from Winnipeg, some cost advantages accrue such as the use of large, fast aircraft for the movement of personnel which would not be justified if Hall Beach was the only site supported from Winnipeg. It is also assumed the community will have an expected life of over 20 years.

8.Economic Analysis

8a.Design Population. The DEW Line site at Hall Beach has about 80 employees on site. It is assumed that 6 employees are required in Winnipeg for administrative and logistic duties. Another 13 employees are required to replace those on their one month holiday. Thus the Hall Beach operation requires a total of 99 employees. A maximum of ten transient personnel is assumed which gives a design population of 90.

Employees in the short term commuting community are assumed to work an 11 hour day, seven day week on alternate weeks. This results in a requirement for about 56 persons on site, 56 persons on days off and 6 persons in the regional centre. With an assumed maximum of nine transient personnel expected, the design population is 65.

The employees in the family community are assumed to work 40 hours per week. This results in a requirement for 116 employees. Assuming the same proportion of employees to total population as in Leaf Rapids, the total population in Hall Beach would be 425.

8b.Capital Costs. The capital costs for the family were assumed to be proportional (on a population basis) to those in Leaf Rapids. A factor of 30% was assumed for increased costs in the Arctic due to the more difficult physical environment, the longer transportation distance and the shorter construction season in comparison to a more southern location such as Leaf

Rapids or Rabbit Lake. Due to difficulties in attracting private developers to such remote areas, it is assumed the major employer will fund all community capital expenditures.²⁶ It is assumed commercial and residential buildings will be either sold with buy-back clauses or leased. The monthly mortgage or lease payments for such property will form income for the major employer. It is also assumed that the purchase prices or rentals will be subsidized to attract private business and residents and to reduce the high cost of living. Capital costs are shown below:

	<u>Cost</u> <u>(\$ Million)</u>
Residential - 108 units	6.33
Municipal - school, recreation, roads utilities	3.27
Commercial	4.67
Single Employee Facilities (for 20 persons)	<u>0.49</u>
- 20 motel type units	
- Dining/Kitchen (600 sq. ft.)	
- Recreation (500 sq. ft.)	
Total	14.76

The short term community with a design population of 65 would have capital costs as follows:

	<u>Cost</u> <u>(\$ Million)</u>
Single Employee Facilities	1.93
- 65 motel type units	
- Dining/Kitchen (2,000 sq. ft.)	
- Recreation (1,000 sq. ft.)	
Municipal - Roads, utilities	<u>0.39</u>
Total	2.32

²⁶Even in Leaf Rapids, the Leaf Rapids Development Corporation was initially responsible for operating community and commercial facilities such as the store, hotel and post office until private individuals or corporations were willing to undertake these services. Linn and Stabler, p. 5-5.

For the long term community the recreation facilities would be more extensive than the single status community and would include a small gym, bowling alley, and curling rink. In reality, these recreation facilities are not present at the DEW Line sites although they are considered highly desirable by the residents.

	<u>Cost</u> <u>(\$ Million)</u>
Single Employee Facilities	2.77
- 90 motel type units	
- Dining/Kitchen (3,000 sq. ft.)	
- Recreation (6,000 sq. ft.)	
Municipal - roads, utilities	<u>0.49</u>
Total	<u>3.26</u>

Elimination of the extra recreational areas previously mentioned would reduce the capital costs by about \$500,000. All capital costs will be amortized at 10% for a 20 year period and the results shown in the economic summary table.

8c. Operating Costs. For the single status communities, it is assumed the major employer pays \$10,000 per year in municipal taxes for its property in the regional centre. Since the major employer would own most if not all the taxable property in the family community the municipal taxes are assumed to be part of the operating and maintenance costs for the community. This could take the form of a grant to an elected municipal government for the provision of some community services.

The operating and maintenance cost of buildings and facilities is assumed at 10%. This higher rate is used due to the prolonged heating season and the high unit cost of energy. These costs are shown in the economic summary table.

For the family community there are no commuting costs due to the

proximity of the work site and the employees' residences. For the single status communities, commuting costs will be based on 5 cents per passenger mile instead of full charter flight costs due to the small number of passengers.²⁷ It is assumed the aircraft will carry cargo necessary for the major employer's operation or perishable goods in addition to passengers for other destinations. It is assumed aircraft are routed through Churchill, Manitoba due to their limited range and the lower aviation fuel costs in Churchill in comparison to Hall Beach. For the short term community, the 56 employees could be rotated weekly from Winnipeg to Hall Beach using a Boeing 737 once per week or a YS-11 twice per week at an annual cost of \$379,000. For the long term community, the 13 employees required each month to replace those going on holidays could be flown in once per month using either the Boeing 737 or the YS-11 at an annual cost of \$20,000. This assumes the rest of the aircraft could be used for urgent material and perishable goods. The Boeing 737 would require over two and a half hours to travel non-stop between Winnipeg and Hall Beach. During the round trip, the aircraft must stop once at Churchill to refuel. For the YS-11 or the F27 the one way trip would take about five hours plus a stop over at Churchill to refuel. The long trip in the slower aircraft may be a disincentive to the short term commuter who must make the slow trip once a week.

Meal costs are increased from those in the previous examples due to the higher transportation costs. These costs are shown in the economic summary table.

27

Approximate costs per passenger mile based on aircraft capacities and costs in Appendix B.

Since it has been assumed that the major employer rents or holds mortgages on residential and commercial property, the major employer receives an income which must be deducted from the annual costs. As previously mentioned, prices or rents will be subsidized so the income does not cover all operating, maintenance and interest costs.

The annual vacation bonus for the family community is assumed to be \$500 for single and \$1,000 for employees living in Hall Beach with their families.

The average cost of wages and normal fringe benefits of the employees in the long term commuting community is estimated at about \$25,600 per employee. For the family and short term commuting community the average costs are reduced since there is no scheduled overtime. The wages in the regional centre are estimated at \$20,000 per employee.

The turnover costs are assumed to be \$2,500 per employee due to the increased transportation costs plus the cost of training some technicians for a period of up to eight weeks at a training centre in the USA. For the family community, an average relocation allowance of \$3,000 is included. This is higher than in the previous examples due to the extra distance and the extra shipping costs due to the limited access to the site. The turnover rate for all community types is assumed to be 20%.

The following table summarizes the economic factors previously discussed. All costs are in millions of 1978 dollars.

Table 11: Hall Beach - Economic Summary

Community Type	<u>Family</u>	<u>Short Term</u>	<u>Long Term</u>
<u>Population Data</u>			
Total Employees	116	118	99
Site Work Force	116	56	80
Design Population	425	65	90
<u>Cost (Millions of \$1978)</u>			
Capital	14.76	2.32	3.26
Amortization	1.73	0.27	0.38
Municipal Taxes	-	0.01	0.01
Facilities Operation & Maintenance	1.47	0.23	0.33
Air Commute	-	0.38	0.02
Meals	0.05	0.14	0.20
Property Income	(1.10)	-	-
Vacation Bonus	0.11	-	-
Employee Salaries	2.47	2.42	2.50
Turnover Costs	<u>0.13</u>	<u>0.06</u>	<u>0.05</u>
Total	4.86	3.51	3.49

9. Quality of Life Analysis

The quality of life ratings will vary from the previous two analyses due to the location and smaller population of Hall Beach. As in the case of Rabbit Lake, only the differences in ratings between Hall Beach and Leaf Rapids will be discussed in detail. These ratings are summarized in Table 12 at the end of the ratings discussion .

9a. Site Factors. The physical environment at Hall Beach is not attractive to most Euro-Canadians who would comprise the majority of the work force. The land is flat and barren with little plant growth. Grass

grows only in small clumps and there are no trees. Although the site is by the water, the prolonged cold period keeps it frozen except for two or three months during the year. Snow is usually on the ground from mid-September to mid-June. The periods of 24 hours of daylight in summer and 24 hours of darkness in winter might be considered a novelty for a few days but are not desirable over a few months. The environment does provide a quiet peaceful setting which is enjoyed by some people. As well, there are limited hunting and fishing opportunities in the area. Thus the physical environment would have a very limited degree of desirability. Winnipeg, as previously discussed, would be rated as very limited.

Isolation at Hall Beach is more severe than at Leaf Rapids or Rabbit Lake since it is accessible only by air and, for few months during the year, by sea. Air services for the family community would probably be provided on a weekly schedule. The availability of radio and television programs would be very limited. Thus the family community would have a very limited choice of modes of transportation and communication. Winnipeg, the regional centre would have a wide choice. The short term commuter would have a limited choice since he spends alternate weeks in Winnipeg. The long term commuter would have air service available only on a monthly basis so his choice is negligible.

Since safety was based on the frequency of air travel rather than distance, the ratings for the safety factor would be identical to those for Leaf Rapids and Rabbit Lake.

9b. Resident Factors. Like Leaf Rapids and Rabbit Lake, Hall Beach is completely dependent upon the major employer. Therefore community development for Hall Beach will be rated the same as those communities.

The family and employees of the family community and the employees

of the single status communities would know most if not all of the community population. The family community would have very limited diversity of population due to a general absence of elderly people, single adult females, and teenagers. Winnipeg would have a wide diversity. The short term commuter would be rated as limited since he has contact with an urban population on alternate weeks. The long term commuter has a negligible diversity of contact since he is in an urban setting only once every six months.

The three community types provide the same opportunities for family interaction as those for Leaf Rapids and Rabbit Lake so this factor is also given identical ratings as those for Leaf Rapids and Rabbit Lake.

9c. Community Factors. For the family community, housing styles would be limited to three and maybe four bedroom units for families with children. Small apartments would be available for childless couples. The vacancy rate would be negligible since a family moving out would likely be replaced by a family moving in. Thus the housing choice is rated as negligible. The ratings for the single status communities previously identified for Leaf Rapids also apply here.

Recreation and entertainment opportunities would be very limited for the family community and would be similar in type to those for the long term commuter who has the same rating. The short term commuter would have a limited choice since he spends alternate weeks in Winnipeg which offers a wide choice of recreation and entertainment.

The family community would not provide any choice for education. Schooling would be provided up to grade six or maybe eight with each teacher instructing several grades. There would not be any courses for adults. The single status communities would be rated as they were in the Leaf Rapids analysis.

Medical services in the family community would be very limited with a nurse or medical assistant and a small medical facility. Medical services for the single status communities are rated the same as in the analysis for Leaf Rapids.

The family community would have a negligible choice of goods and services due to its small population. There would be a combined grocery/department store offering a very limited range of goods. A theatre or auditorium might be used for religious services. The single status communities would have the same ratings as in the Leaf Rapids analysis. The following quality of life matrix which summarizes the factors previously discussed, utilizes the same mechanics as the Leaf Rapids' matrix.

Table 12: Hall Beach - Quality of Life Matrix

Quality of Life Factor	Relative Weight	Community Type					
		Family		Short Term	Long Term		
		E	F	E	F	E	F
Physical Environment (degree of desirability)	1	VL 2	VL 2	VL 2	VL 2	VL 2	VL 2
Isolation (choice of transportation & communication modes)	3	VL 6	VL 6	L 9	W 12	N 3	W 12
Safety (degree of travel safety)	1	W 4	W 4	VL 3	L 2	W 4	VL 2
Community Development (independence from major employer decisions)	2	N 2	N 2	N 2	L 6	N 2	L 6
Interpersonal Relationships (portion of population as acquaintances)	2 (1)	W 4	W 4	W 4	VL 2	W 4	VL 2
(population diversity)	(1)	VL 2	VL 2	L 3	W 4	N 1	W 4
Family Unit (opportunity to interact together)	3	W 12	W 12	L 9	L 9	VL 6	VL 6
Housing (choice)	3	N 3	N 3	N 3	W 12	N 3	W 12
Recreation/Entertainment (choice)	3	VL 6	VL 6	L 9	W 12	VL 6	W 12
Education (choice)	2	N 2	N 2	VL 4	W 8	N 2	W 8
Medical (choice)	2	VL 4	VL 4	L 6	W 8	VL 4	W 8
Goods & Services (choice)	2	N 2	N 2	L 6	W 8	N 2	W 8
Totals		51	51	60	85	39	82
Quality of Life Index		102		145		121	

Legend: Employee (E); Family (F)

Degree of Choice Desirability or Impact	Symbol	Value
Wide/High	W	4
Limited	L	3
Very Limited	VL	2
Negligible/Nil	N	1

10. Decision Evaluation

Tables 11 and 12 provide a summary of the author's evaluation of economic and quality of life factors for Hall Beach. The results of these two tables are summarized in Table 13 below.

Table 13: Hall Beach - Analysis Summary

	<u>Community Type</u>		
	<u>Family</u>	<u>Short Term</u>	<u>Long Term</u>
Capital Cost (\$Million)	14.76	2.32	3.26
Annual Cost (\$Million)	4.86	3.51	3.49
Quality of Life Index	102	145	121

The family community, with the highest capital costs, the highest annual costs and the lowest quality of life index is the least desirable of the three types. The long term community has the lowest operating costs but is rated second in order of preference for capital costs and quality of life. The short term community has the highest quality of life index and the lowest costs. The annual costs are only \$20,000 more per year than the long term community, a factor of 0.6%. The quality of life index for the short term community is almost 17% higher than the long term community's index. Considering the improvement in quality of life, the expenditure of an additional \$20,000 per year in operating costs would be more than justified. Thus the short term community is the most desirable for Hall Beach. The decision to build a long term community at Hall Beach was not the most reasonable based on the assumptions and analysis hereinbefore.

11. Summary

The results of the evaluation for each of the three case studies indicate that in only for Rabbit Lake, was the preferred community type

built. In the other two evaluations, the community built was the "second-best" choice of the three alternative community types. The evaluation also shows that consideration of only capital costs is not a reliable economic indicator. In the case of Hall Beach, the capital cost for the long term community was higher than that of the short term community but the annual costs, including amortized capital cost, were higher for the short term community.

Chapter 4

CONCLUSION

1. Summary and Findings

In this thesis a methodology was developed to evaluate alternative isolated single enterprise communities. The methodology provides the decision maker with a choice of three basic alternative community types along with a detailed evaluation of economic and quality of life factors for each type. The methodology also allows for the participation of the users and potential residents to provide data and feedback in the evaluation process. This will increase the reliability of the evaluation and the reasonableness of recommendations to decision makers to assist them in selecting the community type which best satisfies the needs of the major employer, the residents and the site.

The feasibility of applying the methodology was tested by applying it to three case studies. Leaf Rapids, Rabbit Lake, and Hall Beach were selected as examples of the three community types in the case studies. For each community, a scenario of the two alternative community types was developed and evaluated using the methodology.

The results of the evaluation in the three case studies are summarized in Table 14.

Table 14: Case Studies Evaluation Summary

	<u>Community Type</u>		
	<u>Family</u>	<u>Short Term</u>	<u>Long Term</u>
<u>Leaf Rapids</u>			
Capital Cost (\$Million)	8.20	5.59	8.52
Annual Costs (\$Million)	15.42	14.85	16.12
Quality of Life Index	146	147	120
Order of Preference	2*	1	3
<u>Rabbit Lake</u>			
Capital Cost (\$Million)	4.13	2.92	4.59
Annual Costs (\$Million)	7.94	7.36	8.23
Quality of Life Index	122	136	113
Order of Preference	2	1*	3
<u>Hall Beach</u>			
Capital Cost (\$Million)	14.76	2.32	3.26
Annual Costs (\$Million)	4.86	3.51	3.49
Quality of Life Index	102	145	121
Order of Preference	3	1	2*

Note: * indicates type of community built

In the evaluation of Leaf Rapids, the differences in costs and the quality of life index between the family and the short term communities were quite small with the short term community having a slight advantage over the family community. Thus the decision to build the family community in Leaf Rapids was not the best decision but it was very close. The long term community was clearly the least preferable of the three community types.

The evaluation of Rabbit Lake revealed the best decision had been

made in the selection of the short term community. The family community and the long term community were quite close in comparison of costs and quality of life but the short term community was clearly ahead in the rating of community types. The cost for reducing the period of rotation for the long term community from six to four months was also examined in this case study. The difference in cost was slightly higher for the four month rotation and would slightly improve the quality of life by enabling the employee to spend more time in the regional centre with his family. The period of rotation for the long term community did not have any appreciable effect on the evaluation due to the degree of differences between three basic community types.

The analysis of Hall Beach showed that the short term community was preferred to the long term community which was built. The decision to build the long term community was better than the establishment of a family community which was more expensive and had a lower quality of life index.

Although the evaluation of the three communities resulted in the short term community being the most preferable choice in each case, this result cannot always be expected. In the Leaf Rapids evaluation, there was very little difference between the family and short term communities. The results could almost have been considered a "tie". In the Rabbit Lake evaluation, the quality of life index for the single status communities would have been significantly reduced if most of the employees had their families in small communities such as La Ronge, Uranium City, Fond du Lac, and Stony Rapids which have populations of about 2,000 or less. As well, the nature of the single enterprise may not permit the simplistic approach used in this thesis to calculate the number of employees

required. If the number of employees is increased for the single status communities, their annual cost advantage can be quickly lost in preference to the family community since employee salaries were 51 to 83% of the total annual costs. Although the long term community was not a first preference in the three case studies, it was a second choice for Hall Beach. Adverse flying conditions could increase costs for the short term community due to extra overtime costs for employees at the work site who must wait longer for their replacement shift. Adverse flying conditions could also increase travel risk and reduce quality of life due to flight delays. In such a case, the long term community may be the preferred community type.

2. Strengths and Limitations

A number of assumptions were required to present the methodology as a model of how it can be used in the evaluation and planning of isolated single enterprise communities. In a practical application of the methodology, such assumptions would be replaced by detailed studies. Such studies would examine alternatives to either minimize costs or maximize benefits for each factor. For example, for the air commute, would it be more economical to charter aircraft or have the single enterprise purchase and operate its own aircraft? In the area of meals, would it be more economical to use a catering service or to have the single enterprise provide personnel and logistics for the feeding of employees? Should housing assistance be provided as a separate benefit to employees or should it be included as part of higher salaries? Does one community type offer significant income tax advantages over another community type? Is it economical over the expected life span of the community to use higher quality and more costly materials in an effort

to reduce operating and maintenance costs? Are there government programs which provide grants, low interest loans or special tax incentives which favour one community type over the other? To answer any of the preceding questions, a detailed study would be required.

The thesis relied on literature sources for the quality of life portion of the evaluation for reasons previously outlined in chapter 1. Any practical application of the methodology should involve the potential residents whose inputs can be used in the methodology. The expected residents/users play an important role in the establishment of relative weights for factors, ratings for indicators, and costs which, when evaluated using the proposed methodology, provide an order of preference of community types. The willingness and ability of the prospective residents/employees to thoroughly and rationally consider all factors relating to opportunities and quality of life of the three alternative community types is important to produce an evaluation which honestly reflects the needs and desires of these residents. This would increase the reliability of the evaluation and the reasonableness of the recommendations to the decision-makers.

There is always the possibility that the prospective residents who participate in the evaluation will not be the actual residents of the community. One significant reason for this is the time lag between the evaluation of alternative community types, and the completion of construction of the community. This time lag would be in the order of at least five years. Thus it is possible that some of the actual residents could have different values than those surveyed and this difference could have influenced the evaluation. Since future events cannot be predicted with 100% accuracy, the evaluation must be based on

the best information available at the time. This should involve the input of prospective residents which is a more reliable data source than sometimes dated and generalized literature information.

A potential limitation to the methodology is the size of the work force which would influence the population of the three alternative community types. It is suspected that as the population of the single enterprise community increases, the preference for the family community would increase due to the increase in choice of urban facilities. However the population size at which this would occur would vary with each situation. Thus this thesis does not suggest any population limits for the methodology but recognized their possible existence.

The methodology does not indicate the interaction and interdependence between factors. There are interrelationships among the economic and quality of life factors which were noted in chapter 2. Changes in any one factor, either economic or quality of life, could result in changes to one or more of the other factors. The magnitude of the change to each factor for such second order consequences would have to be calculated for each affected factor.

The methodology can be easily programmed for computer manipulation. With a computer, the sensitivity of the evaluation to variations in the factors could be quickly examined. For example, the period of rotation of employees for the short and long term communities could be varied to optimize the economics and quality of life for each community type.

The methodology is comprehensive and flexible since it uses a large number of economic and quality of life factors which can be varied to suit the particular needs of the site, the major employer and/or the potential residents. This requires the involvement of a number of

specialists in a practical application of the methodology. These specialists would include planners, engineers, architects, estimators, tax accountants, manpower analysts, sociologists, psychologists, environmentalists, etc. The input of some specialists would be limited while others would be involved throughout the entire evaluation process. The input of a large number of specialists, although costly, would increase the comprehensiveness as well as the reliability of the evaluation.

As shown in chapter 3, the application of the methodology may result in the selection of a more economical community type than may have been arrived at by intuition. Annual cost differences between the two most economical community types for Leaf Rapids and Rabbit Lake were over half a million dollars. Since this is an annual savings, the cost of applying this methodology would be quickly recaptured. In cases where the difference in cost is small, the community with the higher quality of life index should be built. This would result in a higher degree of resident satisfaction with the community type which in turn should result in a more stable work-force. An increase in stability of the work-force should increase production output and decrease production costs since the major employer would have fewer employees undergoing training and also lower turnover costs. Thus economics should be a major incentive for use of the proposed methodology.

Use of the methodology should improve the quality of future decisions relating to isolated single enterprise communities. A thorough evaluation of the three community types may reveal the the family community, which presently appears to be favoured by major employers, may not be the most preferable from an economic or quality of life aspect.

This was the result in all three case studies. Although this will not always be the outcome of an evaluation, it shows that a detailed evaluation of the single status communities cannot be dismissed lightly. As well, the single status communities, if selected instead of the family community, provide the major employer with more flexibility to deal with changes in markets, technology or government policy. For example, it is easier to relocate the employees to a new work site within commuting range of the regional centre than it would be to re-establish a family community. Also the single status community can be easily expanded into a family community if employee preferences for commuting change to that for a family community. To change from a family community to a single status community would be a waste of costly facilities.

The methodology can be used to determine the implication of some government policies on the planning of single enterprise communities. The results of the evaluation could show more effective means of achieving government objectives than provided for in legislation. With such information, the major employer could have a stronger case for requesting an exemption from present legislation. For example, the government could advocated the creation of family communities to produce a more permanent population in the north. In such a case, the methodology could be used to evaluate the single status communities to see if they could achieve government objectives as well as improved quality of life and/or costs by using expanded regional centres in the north.

Another area of government policy which could be evaluated with the methodology is the effect of the frequent government requirement to employ a specified percentage of rural or northern natives in new

developments. This would introduce an additional group or groups to the total community population. For illustration purposes, the population in the thesis was divided in only two groups: the employee and the family. However, the methodology can deal with many different subgroups which could be further categorized by the size or characteristics of the regional centre used for the single status communities. For example, a requirement of government policies to employ rural or northern natives in new developments would require the expansion of the quality of life evaluation to treat Euro-Canadians and northern natives as separate groups as shown below.

Community Type

Factor	Family						Short Term						Long Term					
	Euro-Canadian			Northern Native			Euro-Canadian			Northern Native			Euro-Canadian			Northern Native		
	Rel. Wt	E	F	Rel. Wt	E	F	Rel. Wt	E	F	Rel. Wt	E	F	Rel. Wt	E	F	Rel. Wt	E	F
			Σ	Σ			Σ	Σ										
	$\%_C$	Σ_C		$\%_N$	Σ_N													
	Σ_T																	

- Legend:
- E - Employee
 - F - Family
 - Σ - Summation for column or groups of columns
 - $\%$ - percent of total population which is Euro-Canadian (C) or Northern Native (N)
 - Σ_C - Σ for Euro-Canadian group
 - Σ_N - Σ for Northern Native group
 - Σ_T - $\%_C \times \Sigma_C + \%_N \times \Sigma_N$

Due to the difference in culture and lifestyles between northern natives and Euro-Canadians, the relative weight of each factor would not necessarily be the same for each group and the quality of life matrix provides for any differences which may occur. The economics of each community type would also be affected if natives are located in small, scattered, northern settlements rather than having the total work force commute from a large southern regional centre.

3. Future Research

During the preparation of this thesis, the author noted a need for interdisciplinary research into areas affecting the economic and quality of life components of the methodology.

With increasing energy costs, additional research is required to improve the physical form of new isolated northern communities to achieve a more efficient form. Increases in dwelling densities and improvements in construction should be examined by planners, engineers, architects and others to reduce energy costs. In achieving this aim, researchers should also try to reduce capital costs, improve the livability of the built environment and optimize the fit between the built and natural environment. Improvements in these areas should increase the habitability of the northern environment and axiomatically its attraction to potential residents.

The quality of life aspect of the evaluation is a very complex area which provides many avenues for future research for planners, sociologists, psychologists, and others. The components which comprise quality of life and the indicators to measure each component require further research to refine the rating system. Literature sources were relatively weak on the indicators which could measure components of

quality of life in small communities. Most indicators in the literature were developed to compare countries or large urban centres and often use a large population base which would be relatively meaningless for small communities. Due to the increasing mix of people of different ethnic groups, and urban backgrounds in single enterprise communities, more research is required to determine the quality of life factors and their relative weights for the different groups. Examples of such groups are urban Euro-Canadian, rural Euro-Canadian, and rural northern natives.

An area which requires much more research is the effect of the separation of the working spouse on the rest of the family. Literature was extremely limited and often dated. Although much has been written about the single parent family where death, divorce or separation is involved, little has been written about the family where one of the spouses is away from home for short periods (such as those encountered in the short term community) or regular long periods (such as those for the long term community). In this respect, both Gulf Minerals and government observers feel that although initial reaction to the Rabbit Lake commute has been favourable, it is yet premature to draw definite conclusions about the success of this short term community.¹ The operation of the single status community requires further monitoring and research to identify the long term social implications of the commuting lifestyle.

The review of previous decisions to build a particular type of single enterprise community must wait for a period of five to ten years after the community has been built to properly assess its degree of

¹ Scott, p. 23; Nogas (1976), p. 128.

sucess. Since there is also a period of five or more years between the start of the evaluation and the completion of construction, careful documentation of evaluations and decisions is required to provide a meaningful source of information for researchers to review decisions to build a particular type of single enterprise community.

A P P E N D I C E S

APPENDIX A

QUALITY OF LIFE FACTORS ADDENDUM

1. Introduction

The methodology in this thesis uses both economic and quality of life factors in the evaluation. The economic factors described in chapter 2 are tangible and easily quantified. However, the quality of life factors are intangible and are more difficult to quantify. The purpose of this appendix is to describe the quality of life factors and their effect on residents in more detail for readers who are not familiar with single enterprise communities.

The quality of life factors will be discussed in order of their groupings: site factors, resident factors and community factors. The topics of mental health and native people will then be discussed.

The factor of mental health is described only for information purposes since it is not used in the evaluation of the quality of life. Although not a quality of life factor, native people are briefly described with respect to the three community types. Native people have different values and concepts than southern Euro-Canadians which should be dealt with in the evaluation since they affect the economic factors as well as the relative weights and rating of some quality of life factors.

2. Site Factors

As mentioned in chapter 2, the site selected for the proposed community will directly affect the physical environment of the community, its degree of isolation, and travel safety. These factors will now be described in more detail.

2a. Physical Environment

The physical environment of single enterprise communities can usually be considered highly desirable from an ecological point of view. The townsite is often surrounded by forest with bodies of water located nearby. This makes it ideal for outdoor activities such as hunting, fishing, cross-country skiing, hiking and camping.¹ As well, residents have almost immediate access to the privacy and tranquility of nature. Where the single enterprise does not create pollution, the residents enjoy clean fresh air and clear waters. The small area of the community reduces the need for commuting by vehicle thus making the town safer for pedestrians, especially young children, as well as avoiding traffic congestion.

In contrast, the urban built environment is artificial, noisy, and dirty. The concrete and glass structures connected by streets provide an artificial environment, although it may be highly functional. High, massive buildings make people feel insignificant and/or inspire fear and disorientation.² The high number and concentration of industries and high volumes of traffic result in air and noise pollution. The high volume of traffic also reduces pedestrian safety. Outdoor recreation sites are usually limited in size. For example, a subdivision for 1,000 people requires 10 acres to be dedicated as public reserve, usually for recreational purposes.³ The sprawl of the suburban areas

¹ Gertler and Crowley, p.254.

² Daniel Cappon with Mary Roche, "A Catalogue of Stress and Strain, Habitat, vol. 19, nos. 5/6, 1976, p.43.

³ Residential Subdivision Handbook, Municipal Planning Branch, Dept. of Municipal Affairs, Province of Manitoba, Winnipeg, February 1976, p.48.

necessitates the use of vehicles for travel rather than walking. The urban environment seems conducive to a faster pace of activities than that found in a small community.⁴ In fairness, it must be noted that the urban environment does have some pleasing areas such as some attractive buildings, parks, and some well landscaped residential areas.

With respect to climate, single enterprise communities are usually located in less benign areas than the southern urban centres. The winters are often longer and may be colder. The snowfall would likely be less in the more northerly community.⁵ The longer winters, especially if they are harsher than the resident is accustomed to, may cause longer periods of voluntary seclusion. For those communities near the 60th parallel or higher, there is a further reduction in sensory stimulation due to periods of continuous daylight in summer and continuous darkness in winter.⁶ These periods can vary from a few days to several months depending on location. The climate, by reducing levels of sensory stimulation and perhaps contact with other residents, can adversely affect the residents emotions and their mental health.⁷

⁴ Linn and Stabler, p.4-22; Parsons, pp.18, 19.

⁵ R.F. Legget and H.B. Dickens, Building in Northern Canada, Technical paper No. 62 of the Division of Building Research, National Research Council, Ottawa, March, 1959, p.5.

⁶ Leo Zrudlo "Psychological Problems and Environmental Design" Conference on Building in Northern Communities; University of Montreal, May 7-11, 1973. Michael Glover (ed), Arctic Institute of North America, Montreal, P.Q., January 1974, p.120-1.

⁷ MacKinnon and Neufeldt, p.5 ; Abbot and Kehoe, p.7.

Fog is a frequent problem in mountainous regions and some areas of the Arctic. Poor visibility conditions will affect the frequency of flights for the single status communities unless there is a high standard of runway and instrument landing systems.⁸

Construction of settlements in northern Canada, particularly the Arctic, poses technical and environmental problems not encountered in southern Canada. R.V. Nordlund, in his thesis "Settlement Planning in the Arctic" describes how these problems can be either minimized or overcome with careful planning and engineering design.⁹ Areas of concern revolve around the climate with its prolonged cold temperatures, continuous darkness during part of winter, continuous daylight during part of summer, low rainfall and winds.¹⁰ The permafrost in the soil affects the design of building foundations and utility distribution systems. The low annual rainfall affects the replenishment of water supply sources such as lakes and rivers. The prolonged cold slows down bacterial action in decomposing wastes during sewage treatment.¹¹ Thus, the physical environment may limit the population due to the availability of water or the ability of the environment to assimilate waste. The cold, dark winters are a factor in psychological stress which can be counteracted to

⁸ Warnock Hersey International Ltd., Professional Service Division, "Arctic Transportation Study" for Department of Indian Affairs and Northern Development, The Northern Economic Development Branch (no date, estimate circa 1970), p.60.

⁹ R.V. Nordlund, "Settlement Planning in the Arctic", MCP Thesis, University of Manitoba, Winnipeg, Manitoba, 1972.

¹⁰ Much of northern Canada can be described as the equivalent of a desert since its total annual precipitation is less than 10 inches. Legget and Dickens, p.5.

¹¹ Linn and Stabler, pp.3-26, 3-27.

some extent by careful and colourful interior design, landscaping and recreational facilities.

Nordlund recommended a multi-story, high density, multi-dwelling complex as best suited for an Arctic environment. The problem of fire spreading can be reduced by use of fire resistant construction materials, internal alarms, and fire extinguishing systems. The BP-Sohio facility at Prudhoe Bay is an example of combining various spaces and functions in one large building. "But it is questionable whether it is physiologically or psychologically desirable to live in a cocoon, completely isolated from the elements and landscape."¹² In a survey of military personnel at Alert, N.W.T.,¹³ the men were almost evenly divided as to whether the new facilities being planned should be interconnected by corridors so personnel would not have to go outside or whether the buildings should not be connected, thus forcing personnel to travel outside, exposed to the environment. Some personnel felt that forcing personnel to travel outside would be physically stimulating and also alleviate monotony and boredom caused by people remaining in an indoor environment for extended periods of time. For these reasons, the family communities used for comparative purposes were of the latest accepted designs with a mixture of housing types which utilize rather than oppose the existing environment. Such designs are found in Leaf Rapids, Manitoba and Fer-
mont, P.Q.¹⁴

¹² Blanch Lemco Van Ginkel, "New Towns in the North" Contact: New Communities in Canada, NEP Pressman (ed), University of Waterloo, 1976, p.308.

¹³ Questionnaire survey of military personnel at Canadian Forces Station Alert N.W.T. by Major L.P. Richard and Captain I.D. McCreath, Air Command Headquarters, Winnipeg, Manitoba, August, 1977.

¹⁴ Linn and Stabler, p.3-22.

2b. Isolation

The degree of isolation of a community is a major factor affecting resident satisfaction with the quality of life in the community.¹⁵ Isolation is a feeling of being separated, either physically or mentally from others. Lucas notes that "isolation of the single-industry community seems to refer to the potential relationships of the individuals with other groups and communities outside their own."¹⁶ Good transportation and communication systems can help reduce the feeling of isolation by providing the residents of isolated communities with the opportunity for physical, verbal and visual contact with other communities and their residents.¹⁷ Lucas notes that urban residents who have much greater opportunity for relationships with others outside their community seldom take advantage of these opportunities. As a result, he states that "the feeling of isolation ... is probably more closely related to their (residents) attitudes and opinions on the limitations of alternatives than it is to geography."¹⁸

In isolated communities which have no road access, the feelings of isolation become more pronounced with the increased distance from other communities. The degree of access to the community is influenced by such factors as "distance, time, money, convenience, and safety."¹⁹

¹⁵ Lucas, p.109.

¹⁶ Ibid, p.395.

¹⁷ Norman E.P. Pressman, "Social Planning Prerequintes for New and Expanded Communities", Contact: New Communities in Canada, NEP Pressman (ed), University of Waterloo, Waterloo Ontario, 1976, p.183; Riffel, p.28.

¹⁸ Lucas, p.396.

¹⁹ Riffel, p.28.

Convenience refers to the resident's ability to choose when and how to travel to or from the community. "It is very important for most people to feel that they can get in a car and drive out on a road to the main road system of Canada."²⁰ This reduces the feeling of isolation since a resident can drive out of the community whenever he wants. He is not limited to travel schedules of airlines which may provide less than daily service. The lack of road access reinforces feelings of isolation whenever residents go for a drive. A young school teacher in Uranium City expressed this feeling in this way: "When you drive around here and you come to the end of the road and you realize there is no more, its really a weird feeling. I just do not know if we'll stay more than one year."²¹ The "end of the road" is also the end of a resident's ability to choose to drive further. Even when road access is available, residents desire upgrading the standard of the road and often place the highest priority on this improvement.²²

The desire of employees in communities without road access to travel outside the community has resulted in the major employer providing free annual trips to the nearest large urban centre for the employee and his family.²³ The mining company at Nanisivik pays a southern employee's

²⁰ Dr. T.F. Wise, Assistant Director, Development Branch, Dept. of Indian Affairs and Northern Development in Proceedings of the Symposium on Resource Frontier Communities, December 16, 1968, University of Manitoba, Centre for Settlement Studies, Winnipeg, Manitoba, 1968, p.43.

²¹ Mid-Canada Report, Mid-Canada Development Foundation Inc., 1971, p.8.

²² Mrs. Valda Duncan, homemaker and former nurse in Thompson in Proceedings of the Symposium on Resource Frontier Communities, December 16, 1968, University of Manitoba, Centre for Settlement Studies, Winnipeg, Manitoba, 1968, p.19; Matthiason (1970), p.14.

²³ Bancroft, p.35.

return air fare to his southern home, after three months work. Federal government employees in the Territories can fly out twice per year and territorial government employees only once per year to either Edmonton, Winnipeg or Montreal; depending on which district the employee works in.²⁴ Miners in Schefferville and Fermont, P.Q. and Labrador City and Wabush, Newfoundland (Labrador) have included free air transportation in their contract demands.²⁵

The feeling of isolation can also be reduced by providing modern communication systems to connect the residents to other communities.²⁶ This can be done by telephone, television, radio, and two-way or ham radio. This enables residents to maintain contact with the "outside world", to keep informed on national and world events, and to talk to friends and relatives in other communities. In this way "southerners stay aware of big city life in preparation for their eventual return."²⁷ Two-way communication also enables northerners and natives to maintain friendships with residents of other communities, pass information and create an awareness of shared needs and problems.²⁸

For the single status communities the same feelings of isolation are present plus the addition of family separation. Again, the attitudes and capabilities of the family members are instrumental in the acceptance

²⁴ In conversation with residents in Nanisivik and Cambridge Bay, N.W.T. June, July, 1977.

²⁵ "Miners Stress Job Security," Winnipeg Free Press, February 27, 1978, p.13.

²⁶ Abbott and Kehoe, p.9.

²⁷ Mid-Canada Report, p.54.

²⁸ Heather E. Hudson, "Northern Vocies: The Northern Pilot Project in Community Communications." November 1974, (mimeographed).

of the separation of the husband from the rest of the family. The reaction to short or long term commuting will vary from outright rejection to acceptance depending upon the person questioned. In a survey²⁹ of prospective employees and their wives for the proposed short term community of Rabbit Lake, Saskatchewan, a wide range of opinion was found. Of four communities surveyed, Prince Albert, with its lesser employment opportunities, was most receptive to the project. This indicates that as well as the personal traits of prospective employees, the general unemployment situation of the potential labour market area is an important factor to consider.

The following description of isolation in long term communities is the result of the author's discussions with personnel working for the DEW Line in Winnipeg, Cambridge Bay, Hall Beach, and Cape Dyer as well as Canadian Armed Forces personnel at Alert during the summer of 1977.

For the long term community, the employees, in essence, are prisoners of the environment. The only way in or out of the community is usually by air and a person leaves either on holidays, termination of employment or medical evacuation. Usually, there is no other human settlement within easy commuting distance, so personnel are limited to contact with nature outside their community. Visitors, aircrew, and travelling maintenance personnel provide new faces for interpersonal relationships for brief periods.

Most of the isolated long term communities have only male employees. Thus, in addition to being separated from family and friends, these men do not even see women and children during their period of isolation. At some sites where a few women are employed, male-female relationships

²⁹ International Surveys Limited.

can become a cause of social and work conflicts. Careful selection and monitoring of employees can help avoid these conflicts.

Since most of the long term communities are near the Arctic Circle , the employees, mostly southerners, are isolated from the natural surroundings they have been accustomed to. The absence of trees and grass in the barren Arctic deprives the employees of a sensory experience they have been accustomed to.

Personnel on the DEW Line are mostly civilian employees who know when they apply for work that they will be employed in isolated locations. High wages with weekly overtime provide an incentive to tolerate the isolation. Some personnel work to save money for a house, business or retirement back south. Sometimes the personnel lose sight of their goals and keep working just for the money even though they have enough money saved for their initial aspirations. Personnel with 18 years experience on the DEW Line are not uncommon. In some cases, the family becomes accustomed to the high income and prefers the family separation to a reduced lifestyle which would result if the employee obtained lower paying work in the home community. For some people, the DEW Line is a means of escape from the pressures of family, finances, and/or urban life. In such cases, personnel selected the isolation by choice when they applied for employment.

In contrast, military personnel accept a one year tour on the Dew Line or a six month tour in Alert as military requirement. Most personnel consider such tours as the least desirable of their careers due to the prolonged separation from their families. In contrast to civilians who do not seek employment on the DEW Line if they dislike isolation, military personnel must terminate their employment in the military if

they do not want an isolated tour. Other positive aspects of the military often enable the person to accept the isolated tour as part of military life, although few would volunteer for a tour at such isolated units. The degree of choice in accepting employment at an isolated site for six or more months can affect a person's outlook on life in the community which in turn affects relations with fellow employees and the person's mental health.

The physical isolation of the community results in high transportation costs which axiomatically increase the construction and living costs.³⁰ If there is no road access from southern sources of supply, material must be either flown in or brought in by water transport if the community is reasonably close to navigable waterways. For the initial construction of the community, the construction of a winter road may be economically justified by the large amount of construction material required at the site. If seasonal transportation is available in addition to air transportation, then bulky and non-perishable goods can be shipped during the navigation season. This necessitates warehousing facilities to accommodate the goods until the next shipping season. For example, in Inuvik, where non-perishables are shipped in by barge, stock turns over a few times a year rather than bi-weekly or monthly which is common in more accessible communities.³¹ Inuvik receives 3,000 to 3,500 tons of foodstuffs annually; 2,000 of it by barge and the rest by air. The cost of warehousing large amounts of goods are passed on to the

³⁰ Riffel, p.30.

³¹ MPS Associates and Canalog Logistics Ltd., "Cost of Transporting Goods into the Mackenzie Valley" prepared for Arctic Transportation Agency of Transport Canada, July, 1977, p.20.

consumer, further increasing the cost of living. However, these warehousing costs are less than the costs of shipping the same goods by air. To compensate for the higher cost of living, the major employer can offer higher wages, isolation allowances or subsidize transportation of such necessities as foodstuffs and fuel.³²

2c. Safety

The periodic commuting by air to the single status community exposes the employees to an increased risk of being involved in aircraft accidents. Occasionally, poor visibility conditions will affect the frequency of flights unless a high standard of runway and instrument landing systems is provided. The majority of personnel surveyed for the Rabbit Lake project felt the risk of flying was incidental and that the company would not operate unsafe aircraft or fly in extremely hazardous weather conditions.³³ Workers on Arctic oil exploration sites who work two weeks on, one week off, complained not of the risk of flying, but of poor plane schedules which resulted in delays in returning home.³⁴ Thus, the risk of flying does not appear to be a deterrent for most people commuting by air to isolated work sites.

3. Resident Factors

The factors of community development, interpersonal relationships and family depend on the residents' desires and opportunities to interact with other residents, including other members of the family. The

³² Riffel, p.30.

³³ International Surveys Limited, pp.29, 30, 55, 67.

³⁴ Hobart, p.17.

following description of the factors is brief considering the depth of each factor. The references in the footnotes will prove useful to the reader who wishes to pursue these topics further.

3a. Community Development

As previously mentioned, community development has three aspects: physical, social, and political. This factor will be limited to the social and political aspects of community development since the physical aspects have been discussed under physical environment and costs.

The single major employer is responsible in whole or in part for the general location, size and costs of the single enterprise community. Provincial and/or Federal governments set out conditions and cost sharing arrangements with the major employer for the development and political evolution of the community. Examples are the B.C. Provincial Municipal Act, Section 10A; Alberta's New Towns Act of 1969; the Mining Act of Quebec, the Quebec Mining Towns Act, and the National Housing Act, Section 45, New Communities.³⁵

The Ministry of State for Urban Affairs is presently involved in the examination of the advantages and limitations of three methods of resource community development.³⁶ These are private enterprise eg. Fermont, P.Q.; crown corporation eg. Leaf Rapids, Man.; and a public-private consortium eg. Nanisivik, N.W.T.. Policies and budget considerations will affect the initial townsite construction as well as the operation of the town in the future. The role of the developer, either private or public, in the administration and political development of the

³⁵ Pressman (1975), p. 34; Robinson, pp. 55-6, 144.

³⁶ Correspondence with Barry S. Wellar, Director, Non-Metropolitan Community Development, Ministry of State, Urban Affairs, Canada, February 23, 1978.

town can greatly affect the quality of life in the town by either con-
straining or facilitating the political development of the community.

Policies adopted for the administration and political develop-
ment of the community could facilitate the political development of the
community and instill a sense of control in the residents over some as-
pects of the future of their community. This would help residents feel
they are part of their community and would increase their sense of iden-
tification with the community since they would be dealing with activities
and problems within their community.

Lucas describes many of the problems encountered in the transi-
tion stage of development

"Once the plant is in operation and a fairly stable pop-
ulation established, the company is usually anxious to
leave the vexing problems of real estate, social planning,
community activities and local financing. It prefers that
the conflicting social aims be decided by citizens, coun-
sellors and mayor within a community budget according to
provincial requirements for municipal affairs. This in-
clination on the part of the company is supported by pro-
vincial legislators who have made local self-government
mandatory."³⁷

For the purpose of the analysis, it was assumed the developer
would provide for the reasonable desires and expectations of the resi-
dents. The single status communities would be developed solely by the
major employer who should also provide for the reasonable desires and
expectations of the employees. With these assumptions, the effect of
the type of development on the physical form and quality of life of the
community was negated and was not considered further in the evaluation
of the three community types. However, the development of the

³⁷ Lucas, p. 72.

community could affect cost sharing arrangements the major employer may wish to enter into with other private or public agencies.

The single major employer plays a dominant role either directly or indirectly in the local government of the community. The major employer is often the major source of municipal taxes, but has only one vote as a taxpayer such as in Kitimat, B.C. and Leaf Rapids, Manitoba. To guard against an overly ambitious town council, the major employer can use closure of the single enterprise as a threat over the community.³⁸ Problems such as conflicts of interest occur when elected municipal representatives are also employed by the major employer.³⁹ Often the major employer, regardless of its policy will become the scapegoat for many of the community's inadequacies. If the employer agrees to help the community when asked, it is often accused of trying to run the community. If the employer refuses, then it is accused of not being interested in the community. There is a danger that "too much paternalism on the part of the company ... will inadvertently take the initiative from the town-people, ... leaving a tremendous void where there usually exists a community spirit."⁴⁰ Residents take greater pride in facilities that they, (the community) vice the major employer, had provided themselves.⁴¹

In single enterprise communities, there is often social stratification along the hierarchical lines of the organization of the major employer.⁴² There can also be stratification of professional and non-

³⁸ Robinson, p.155.

³⁹ Lucas, p.75.

⁴⁰ Lucas, pp.88, 84.

⁴¹ Lucas, p.84; Jim Lotz, Northern Realities, New Press, Toronto, 1970, p.158.

⁴² Lucas, p.151; Robinson, p.84.

professional workers who provide institutional and other services to the single enterprise employees.⁴³ Such social stratification can adversely affect interpersonal relations. Careful attention in planning the community as well as in formulating administrative policies for the town can reduce social stratification.⁴⁴

Since there is a single major employer, workers in most trades or professions are limited to it. If an employee becomes dissatisfied with the major employer and desires alternative employment, he must leave the community in most cases. With limited job openings, the major employer is often unable to absorb the community's youth into its work force. This forces many young people to leave the community.⁴⁵

The nature of work available in the single enterprise may be unattractive to most women and thus limit employment for women, including housewives. Work opportunities for females outside the single enterprise would also be quite limited.⁴⁶ This lack of work for females has two effects. Firstly, the young women in the community either marry early or leave for better employment opportunities.⁴⁷ The result is a low number of single women for single male employees to socialize with. This contributes to the more rapid turnover of single male employees.⁴⁸

⁴³ Lucas, p.164.

⁴⁴ L.B. Siemens, "Single-Enterprise Communities on Canada's Resource Frontier", Contact: New Communities in Canada, NEP Pressman (editor), University of Waterloo, Waterloo, Ontario, 1976, p.283-285; Porteous (1976), p.337.

⁴⁵ Lucas, ch. 15.

⁴⁶ Lucas, p.355; Riffel, p.39.

⁴⁷ Lucas, p.95, 355-358.

⁴⁸ Lucas, p.51.

Secondly, a wife who is accustomed to or desires employment finds boredom more difficult to cope with. This boredom plus the lack of additional family income can contribute to turnover of married employees.⁴⁹

Single enterprise communities are often characterized as lacking a sense of community. Riffel describes this as "the needs of individuals for identification and belongingness, for feeling that they are part of a "community with which they want to affiliate."⁵⁰ Due to their nature, the single enterprise communities have an air of impermanence since they are subject to the market demand for resources, changes in technology, or the policies of government.⁵¹ As such, the future of the community is beyond the control of its residents. Gertler describes the feeling as follows:

...you do not find it (the resource community) a bad place to live. The kids are happy at school and they seem to have plenty to do. ...There's practically no delinquency in town; ...You should be satisfied, but you're not. Somehow, it is hard to feel that you belong. Maybe because, rightly or wrongly, you believe that whatever goes on in town is controlled by someone sitting in a big office at the top of Place Ville Marie, by the price of copper or some other damn thing over which you have no control.⁵²

The feeling of impermanence is enhanced by the transiency of the residents who stay for only a few years.⁵³ In describing an eastern mining town, a minister observed that

⁴⁹ Proceedings of the Symposium on Resource Frontier Communities, p.71.

⁵⁰ Riffel, pp.54, 55.

⁵¹ Bancroft, p.8.

⁵² Gertler and Crowley, p.259.

⁵³ Lucas, pp.47, 205; Riffel, p.55; Nickels and Kehoe, p.13; Blumenfeld, p.12.

This place is not a permanent home to any families that I know. Even though a family has been here 10 to 15 years, its not where they're going to retire. There is a continual reference to 'going outside.' This community is modern in all aspects but⁵⁴ there is more to a community than modern conveniences.

In isolated communitites, the high cost of living and limited choice of goods and services makes it difficult for workers to retire and live off their pensions. The limited medical facilities make it difficult for retired people to receive the necessary level of medical services normally required in this latter stage in their life cycle.

The susceptibility of the single enterprise community to abandonment as a result of withdrawal of the single major employer has prompted the creation of "non-permanent communities" which can be relocated when no longer needed.⁵⁵ An example is Manitoba Hydro's temporary townsite of Sundance which has an estimated life of 15 years. Over 160 families are accommodated in portable housing units.⁵⁶ This susceptibility to abandonment also contributes to an air of impermanence in the community which affects the stability of the population.

The political participation of residents in governing their community can increase the sense of community. Here people are making some decisions affecting the future of "their" town rather than having these decisions made by an outside agency such as the major employer or govern-

⁵⁴ Mid-Canada Report, p.8.

⁵⁵ Parker.

⁵⁶ Interview with Don Bowden, Manitoba Hydro, Winnipeg, Manitoba, May 18, 1977.

ment. Such decisions would usually be minor local matters with major decisions being made outside the community in response to political or market influences.

For the single status communities, the employees would have no "sense of community" for the place of work since they are workers, not potential long term residents. They would strongly identify with their home community where their families live. Fried considers single status communities such as DEW Line stations as technical stations where men are employees not settlers, just do tasks and have no need or little opportunity to change the organization of the station.⁵⁷ The employees would identify with the employer or work location, but not in a sense of community. The employees' sense of community would be identified with the home community where their family and friends live. Due to the employee's intermittent absence from his home community, his sense of community may be weaker than that of a resident who is employed in the family community.

In the single status communities, the major employer's influence would be limited to the work site. In the regional centre, local government, employment opportunities for females and youth and social stratification would generally be beyond the influence of the major employer due to its absence.

3b. Interpersonal Relationships

In the small isolated single enterprise communities, residents get to know each other as acquaintances, friends or neighbours, so that "a stranger in the community is conspicuous." The residents live, work,

⁵⁷ J. Fried, "Settlement Types and Community Organization in Northern Canada," Arctic, Vol. 16, No. 2, June, 1963, p.95.

shop, play and pray together in contrast to urban dwellers who have the opportunity to share each activity with different people. This high level of observability is a mixed blessing which produces social control and social conflict. Social control would often take the form of "negative sanctions imposed by friends, neighbours, and fellow citizens."⁵⁸

Gossiping is often considered as a major problem of social life in isolated communities. Lucas considers gossip "as a major category of social conflict" and also as a "mechanism of social control." Gossip is used against those whose behaviour fails to meet the expectations and norms of the general populace. The higher a person's status in the community, the higher are the expectations and norms of his/her behaviour. Often informal knowledge gained by gossip gives people power and influence over others since the general release of this knowledge could result in a loss of reputation, status or face for the individual concerned. The tendency of a person to gossip will affect their relations with others since other people tend not to trust a gossip with information. "The fact that everyone has the goods on everyone else inhibits out and out personal battles or ruthless community conflict..... Gossip, by its nature, tends to inhibit public confrontations."⁵⁹

Social conflict also occurs in the inability to separate work and leisure. Professionals such as doctors and clergy are expected to be "on duty twenty-four hours a day, seven days a week."⁶⁰ This makes it morally difficult for the professional to leave the community for short

⁵⁸ Lucas, pp.169, 178, 181.

⁵⁹ Lucas, pp.345-351.

⁶⁰ Lucas, p.181.

trips or holidays unless alternative arrangements can be made to provide the community with the expected services.

For professionals such as doctors and teachers, the continuous observability of their behaviour by the residents during work, leisure, or private life limits their friendships with the residents. At the same time, the professional can observe the residents and develop a knowledge of the residents' background which assists the professional in providing his/her services to the residents.⁶¹

In the single enterprise, the familiarity of supervisors with workers sometime strains relationships. "It is difficult to enforce impersonal and rational industrial discipline when relationships are warm and personal." These relationships between employer and employee are sometimes used to influence the hiring of the employee's family or relatives.⁶²

Interpersonal relationships can also be affected by religion. Religious segregation can occur in the school system and religion sponsored activities. Resistance to intermarriages between such religions as Protestant and Roman Catholic can divide families, relatives and friends. As well, this limits potential marriage partners for an already small population. Conversely, church activities can also bring congregations closer together by major activities such as building a new church.⁶³

In the short term community, interpersonal relations produce little social conflict. There are some minor difficulties with people working

⁶¹ Lucas, pp.180, 181, 257, 268, 315.

⁶² Lucas, pp.139, 174.

⁶³ Lucas, pp.306-323.

and living together but since workers get completely away from the work environment at frequent intervals, they have an opportunity to make personal contacts with people other than fellow employees.

For the long term community, interpersonal relations become more important and critical due to the prolonged contact with fellow workers. With everyone working and living in a limited area, the desire for privacy or withdrawal becomes greater than the need for social contact.⁶⁴ The close confinement of personnel leads to irritability which if unchecked, could result in quarrels. However, most persons are afraid to discharge hostilities because of consequences of such actions, so repression, suppression and withdrawal usually results.⁶⁵ Nelson states "it matters little whether an individual is essentially withdrawing or outgoing in relation to station members as long as he does not annoy, irritate or cause dissention among them."⁶⁶ This statement should have been qualified since an outgoing person is likely to improve morale and personal relations resulting in a more cheerful, happy group. However,

⁶⁴ T.J. Boag, "The White Man in the Arctic", The American Journal of Psychiatry, vol. 106, no. 6 December, 1952, pp. 444-9; Paul D. Nelson, "Human Adaptation to Antarctic Station Life," Medicine and Public Health in the Arctic and Antarctic, Selected Papers from a Conference, World Health Organization, Geneva, 1963; Marani, Rounthwaite and Dick, CFRS Alert NWT-Environmental Study, Report to the Department of National Defence, 7 May, 1971, Paragraph C. 3(1); David Mc K. Rioch, "Psychiatric Problems of Man in the Arctic," Man Living in the Arctic, Proceedings of a Conference, Quartermaster Research and Engineering of Centre, Natick, Mass. 1-2 December, 1960, Frank R. Fisher (ed.) National Academy of Sciences, National Research Council, Washington D.C. 1961.

⁶⁵ Boag, p.446.

⁶⁶ Nelson, p.142.

a person must not be too outgoing and infringe on the privacy needs of others which would result in annoyance, irritation or dissention among the group.

3c. Family Unit

The three different community types subject the family to different stresses due to the varying periods of absence of the employee, who, in most cases, will be the father. The effect of separation on the family would be related to the stability, values and expectations of the family members.

Very little research has been done on the effect on the family of the temporary absence of one parent. Most of the research on single parent families deals with the permanent absence of one parent (ie. widowed, divorce, separated).⁶⁷ The temporary absence of the father cannot be equated to the continuing absence of the father and similarly planned and socially accepted absences cannot be equated to socially disapproved absences.⁶⁸

The absence of the father may result in a lack of a sex role model for the children, particularly boys. Some tests indicated that lacking a sex role model, the boy is more likely to become feminized. He may show this by dependency and passivity or by compensatory masculinity.⁶⁹ However, the tests are of doubtful use since they do not judge the child's

⁶⁷ Benjamin Schlesinger, The One Parent Family: Perspectives and Annotated Bibliography, University of Toronto Press, 1970 .

⁶⁸ Elizabeth Herzog and Cecelia E. Sudia, "Fatherless Homes," Children, vol. 15, no. 5, Sept-Oct, 1968, p.179.

⁶⁹ Ibid, p.179; David B. Lynn and William L. Sawrey, "The Effects of Father Absence on Norwegian Boys and Girls," Journal of Abnormal and Social Psychology, vol. 59, 1959, p.261.

basic well-being or potential for future well-being.⁷⁰ As well, there may not be a lack of male role models due to the presence of neighbours, relatives, and teachers, plus the influence from peer groups, television, and movies.⁷¹ The children's perception of authority and love of the father does not appear to be affected by his intermittent absence.⁷²

The absence of the father also affects the children's informal education. For the short term commuter, this affect would be very slight due to his presence with the family on alternate weeks. The effect on the long term commuter's children would be greater due to his six month absence. Men on the DEW Line frequently mentioned that their prolonged absence adversely affected their sons' learning of typical male skills, such as the use of tools and care of equipment such as bicycles and cars. Sports skills are also affected since the father cannot practice with the boy or give extra coaching in such sports as baseball, football, hockey, and soccer. Also there is an inability to provide support as a spectator at the children's games. The transportation of the children to various sporting activities usually falls on the mother who may get assistance from friends and neighbours.⁷³

The father's absence also affects the family's social and recreational activities. The mother would probably be excluded from activities such as dances and mixed sports where the presence of both spouse is

⁷⁰ Herzog and Sudia, p.180.

⁷¹ Ibid, p.181.

⁷² Alan J. Crain and Caroline S. Stamm, "Intermittent Absence of Fathers and Children's Perceptions of Parents." Journal of Marriage and the Family, vol. 27, 3, August, 1965, pp.344-7.

⁷³ In conversation with DEW Line personnel at Cape Dyer, Hall Beach, Cambridge Bay and Winnipeg, 15-21 June, 1977.

deemed socially desirable. The spouse would also lack the emotional and moral support, advice and encouragement the father usually provides. The father's presence helps to avoid boredom after the children go to bed and provides a familiar and trusted person to confide with on important family issues.⁷⁴

In discussions of the Rabbit Lake (short term community) project at various Saskatchewan communities, wives of potential employees expressed a variety of opinion about separation from their husbands. Some women "seemed to be afraid of coping with the day to day decisions normally made by a man and would not tolerate the lonely evenings without him." As one woman said "What's the point of being married?" Other women expressed a need "for a husband to help manage the children, especially teenagers". Some women expressed a fear that they would grow apart from their husbands and similarly for the children. In Saskatoon, Melfort, and Biggar, the majority of those surveyed preferred the family community over the short term commuting community so the family could be together. One group of women, whose husbands are frequently away on construction jobs, saw the project as providing a more stable family life, since they would be able to plan on their husbands being home for specific periods. In Prince Albert, many women felt the project provided employment opportunities for the husband while allowing the rest of the family to stay and maintain their home in Prince Albert.⁷⁵

⁷⁴ The One-Parent Family; Report of an Inquiry on One-Parent Families in Canada, The Canadian Council of Social Development, October, 1971, p.12.

⁷⁵ International Surveys Limited, pp.16, 17, 27.

The family community, with its small population and rural setting is often felt by many residents to be a good place to bring up children.⁷⁶ As well, the family, in the family community "may be of special significance to people as the source of personal identity and the satisfaction of basic emotional desires."⁷⁷ This may be due to the transient nature of the population and the lack of outside activities. The family community provides the greatest opportunity to maximize internal relationships in the family. However, the opportunity for external relationships outside the family is more limited than in an urban environment. Some of the quality of life factors may strain marital relations resulting in alcoholism and/or marriage break-up.⁷⁸ There is a further problem with young female teenagers who may become involved with alcohol or premature sexual relations due to advances made by the single male employees who lack females their own age to socialize with.⁷⁹

4. Community Factors

The factors of housing, recreation/entertainment, education, medical and goods and services are generally functions of the community. As previously stated, the availability of these community functions is often directly proportional to the population. Again, the description of the

⁷⁶ Gertler and Crowley, p.259; Riffel, p.49; Inventory Report 1976 for Resource Community Development, p.9-23; Paterson Planning and Research Ltd., "Life Style Preferences of Rural Non-Farm Residents," R.M. of Springfield, Manitoba, prepared for Municipal Planning Branch, Dept. of Municipal Affairs, Manitoba, Toronto, April 1973, p. iii; Bancroft, p.28; Matthiason (1971), p.28.

⁷⁷ Riffel, p.45.

⁷⁸ Inventory Report 1976 for Resource Community Development, p.9-25.

⁷⁹ Matthiason (1971), p.30; P. Grouette (in interview).

factors really just "skims the surface" of some very broad subjects.

4a. Housing

For the single status communities, the accommodation would consist of hotel or motel type accommodation with one room units for personnel. Communal facilities would include washrooms, laundry rooms, and lounge or relaxation areas. Meals would be provided in a dining room complete with kitchen facilities. Due to its nature, the short term community could require as little as 50% of the facilities area that the long term community requires. The savings in area would depend on the nature of the single enterprise and its personnel requirements.

For the single worker in the long term community, accommodation in the regional centre during his holiday period could be a problem. If the employee does not have parents, relatives or friends in the regional centre with whom he can live during the leave period, he would be forced to either live in a hotel or boarding house. This could be quite expensive. Some employees could treat the leave period as a typical holiday and take trips to holiday areas while living out of a suitcase like a tourist. In this thesis, it was assumed that the single employee would live with close relatives during the leave period or take tourist vacations so accommodation during the leave period would not be a problem.

For a family community, the accommodation requirements are greatly increased. Firstly, the number of personnel requiring accommodation is increased due to the need for teachers, medical staff, commercial and service industry staff and police. With an average of 3.5 persons per family, the community population is about four times the number of workers employed by the major industry. The presence of the workers' family necessitates family housing which in the past has consisted primarily

of detached single family dwellings with some apartments for childless couples.

Housing form has been a controversial issue in remote single enterprise communities. For reasons of energy conservation, lower capital costs, and resident travel, designers have preferred compact, medium density residential areas clustered around the community's commercial, recreational, and educational facilities. However, the residents oppose such design in favour of lower density residential areas such as normally found in the suburbs of southern cities. Lucas noted that "planners in the Arctic find that individuals insist upon self-contained houses despite the difficulties of heating, weather, distance, and cost. The self-contained home permits family life with minimal observation from outside"⁸⁰ and thus acts as a social insulator. A.E. Moss, in his presentation to the Third Northern Conference in Whitehorse in 1969, noted that most people were reluctant to purchase part of a structure, such as a duplex, row house or apartment, preferring instead a single, detached house.⁸¹ In Fermont, P.Q., the number of single detached houses was increased to about one third of the dwelling units as a result of participation by the prospective residents in the design process. "It was deemed important to respond to psychological needs of some future residents who aspire to live in "bungalows" like "other people" farther south".⁸² In Leaf Rapids, opposition by the prospective residents to the initial plan for

⁸⁰ Lucas, p.185.

⁸¹ A.E. Moss, "Design for Northern Communities" The Developing North, Transactions of the Third Northern Conference, Whitehorse, Yukon, 1969, p.10.

⁸² David Clunie, "Two New Northern Communities", Contact: New Communities in Canada, N.E.P. Pressman (ed), University of Waterloo, August 1976, p.312.

high-density housing resulted in a lower density development.⁸³ Further to the rationale for single detached houses in northern climates, Riffel states:

If the ideal form of dwelling is taken to be the single family house, and if fewer single family houses are available in resource towns, then it can be assumed that the incentive to move to resource towns is diminished.⁸⁴

Housing is often heavily subsidized to attract and retain workers. Home ownership has been associated with longer periods of residency in single enterprise communities.⁸⁵ To help reduce employee turnover, the major employer may encourage home ownership by subsidizing house prices and mortgage interest rates as well as reducing or eliminating the requirement for a down payment.⁸⁶ In 1976, a Quebec-Cartier Mining Company employee in Fermont could purchase a three bedroom bungalow with garage and basement for \$11,500. This dwelling costs the company \$75,000. There was no downpayment required except for renovation costs and the mortgage was at 8 $\frac{3}{4}$ %. The company has a buy-back clause which includes appreciation at 4 1/2 - 5% per annum and payment of up to \$2,500 for improvements made by the owner.⁸⁷ Such housing subsidies make the ownership of dwellings highly attractive for the employees of the single enterprise.

For people who are not employed by the major employer, such as

⁸³ Siemens (1976), p.280.

⁸⁴ Riffel, p.16.

⁸⁵ Michel Nadeau, "Fermont OÙ Le Nord Québécois Apprivoise", North, vol. XXIV, no. 1, January-February, 1977, p.8; Nickels and Sexton, pp.141, 143.

⁸⁶ Supplemental to the Dryden Observer, April 27, 1977, p.8; Riffel, p.18; Robinson, p.46.

⁸⁷ Inventory Report 1976 for Resource Community Development, pp.5-20, 5-21.

private businessmen, the high cost of housing makes life difficult. Also, if the town experiences a decline, the lack of buy-back clauses results in a large financial loss for these people.⁸⁸

There are also the aspects of safety and privacy in housing types. Some residents in Cambridge Bay, N.W.T. expressed concern over problems of noise transmission and the danger of fire spreading in multi-unit dwellings.⁸⁹ Due to limited fire fighting equipment, cold winters and a general absence of a water distribution system with fire hydrants, fires can quickly spread unless extinguished in the early stages. To ensure early detection, the new apartment unit built in Cambridge Bay in 1978 has smoke detectors.⁹⁰ With single detached houses spaced 25 to 50 feet apart, it is more difficult for fire to spread from one unit to the other.

Noise transmission through common walls is a frequent complaint by both natives and whites. This can be overcome by better design. However, in Leaf Rapids, native families often have relatives visit for extended periods of time during which drinking and partying goes on.⁹¹ This disturbs neighbours on the other side of the wall in multi-unit dwellings. As a result, single detached houses are now provided specifically for natives.

88 Robinson, p.97.

89 Views expressed by residents of Cambridge Bay during informal conversations with the author during a visit 18-21 June, 1977.

90 Review of construction specification for apartment construction in Cambridge Bay, 20 June, 1977.

91 Linn and Stabler, p.5-33.

For the reasons previously outlined, the housing costed in the case studies was of the latest acceptable designs such as that used in Leaf Rapids, Man. and Fermont, P.Q.⁹²

4b. Recreation/Entertainment

Recreation and entertainment facilities provide residents with opportunities for the satisfying and creative use of their leisure time. Sports facilities provide an outlet for emotional tensions which, if left unchecked, could adversely affect the person's relationships with others in the community. Voluntary organizations provide residents with the opportunity to pursue leisure activities and/or interests with other community residents who share similar interests.

For the size of the population, most single enterprise family communities are well endowed with recreational facilities. These facilities may include a gymnasium, swimming pool, curling rink, skating rink (usually artificial ice), bowling alleys, tennis courts, golf course, sports fields, playgrounds and parks.⁹³ Examples of towns with many of these facilities are Faro, Yukon (population 1,471); Leaf Rapids, Manitoba (population 2,200); and Fermont, P.Q. (population 5,000).⁹⁴ South Bay, Ontario, with a population of 400 has a recreation complex with a gymnasium, library, show hall, indoor swimming pool, curling rink, games room, meeting rooms and a lounge.⁹⁵ In all cases, the single major employer

⁹² Ibid, p.3-22.

⁹³ Robinson, p.87.

⁹⁴ "Anvil", Anvil Mining Corporation, Ltd., booklet, p.22; Clunie, p.309; Norbert Schoenauer, "Fermont: A New Version of the Company Town", Contact: New Communities in Canada, N.E.P. Pressman (ed), University of Waterloo, August 1976, p.318.

⁹⁵ Supplemental to the Dryden Observer, p.11.

provided most of the funding for these facilities. Robinson suggests the companies' motivation for such expenditures is to improve production since an "employee who is actively engaged in sports or hobbies... has no time or excuse to grumble, and is, therefore, likely to be happy at his work if he is happy at his play and home life".⁹⁶

Due to the typical wilderness location of many single enterprise communities, outdoor recreation activities such as hunting, fishing, skiing and boating can be enjoyed usually within short distances of the community. "The simple pleasures of fishing and winter sports provide incentives for migration to northern environments".⁹⁷

The number of voluntary associations and formal organizations in a single enterprise family community is high along with the degree of resident participation in them.⁹⁸ Many communities complain of being over-organized which puts pressure on residents to participate when required, rather than when desired.⁹⁹ In interviews about recreation, Lucas consistently found contradictory statements, often in the same interview. "Respondents maintain: (i) there is nothing to do in the community, (ii) the community is over-organized, (iii) they are very busy and small-town life is most rewarding, and (iv) people are apathetic."¹⁰⁰ There is nothing to do in the sense there is nothing new to do, since the residents are limited to the same people and activities due to the small population. To experience a change of people and

⁹⁶ Robinson, p.88.

⁹⁷ Gertler and Crowley, p.254.

⁹⁸ Robinson, p.88.

⁹⁹ Lucas, pp.195, 198, 219; Riffel, p.52; Mid-Canada Report, p.54.

¹⁰⁰ Lucas, p.195.

activities, one must travel to a larger community or city. The large number and variety of activities enable most people to participate in activities of their choice to satisfy their leisure requirements and to form interpersonal relationships with others. The large number of organizations and activities makes it difficult, if not impossible, for people to participate in all the activities that they might wish to. In this way the community is over-organized. Since the residents must limit their participation, they might be considered apathetic by those organizations they do not join.

The short term community would have very limited recreation facilities due to the limited leisure time of the employees. Recreation facilities could include table tennis, pool tables, shuffleboard, darts, exercise rooms and a movie theatre such as in Rabbit Lake. Outdoor sports such as fishing and skiing could be pursued at an individual's discretion. Associations and formal organizations would be quite limited since recreation activities would be individual, such as table tennis, pool and shuffleboard where one merely has to find a partner to have a game. The employees may form an organization to operate a licensed club facility and a movie theatre such as at Rabbit Lake.¹⁰¹

The long term community should have more extensive recreation facilities due to the employees' greater amount of leisure time and the longer duration of family separation. Alert, N.W.T. has a gymnasium, curling rink, and bowling alley in addition to the facilities mentioned for the short term commuting community. These larger facilities enable more personnel to participate together in an activity which promotes

101

Nogas (1976), p.128.

teamwork and comradery.

The long term community would have a larger number of associations and formal organizations due to the longer stay of personnel. Some of the organizations such as curling, bowling, and other sports clubs are dependent upon the presence of facilities to accommodate such activities. At Alert, N.W.T., the following organizations and clubs are present: photography, lapidary, bowling, curling, radio, TV, Ham radio club, and a museum and historical society. The viability of each organization is dependent upon the interest and effort of its members. These organizations help relieve boredom by enabling people to pursue their interests and reduce the amount of time a person thinks or worries about his family back home. They also provide an alternative to passing one's leisure time by just drinking.

4c. Education

The children of the employees at a single status community normally attend schools in the regional centre which usually has a much larger population than the family community. As a result the regional centre would likely have private, vocational, and professional schools plus technical colleges and universities which provide students with an opportunity to pursue post-secondary education or training without having to move to another location. As well, specialist training is available for handicapped students. There are also a wide range of courses available for adults for their interest, academic upgrading or vocational skills.

With a larger student population, there would be no need for one teacher to instruct several grades of students in one class as frequently occurs in small communities. Lucas notes the result of a 1962

survey of single enterprise communities in which 12 of the 50 communities sampled had no facilities for vocational or technical training. These 12 communities all had a population of less than 15,000. In addition, some communities "were so small that there was no provision for the small number of youth who require the advance grades of high school."¹⁰² In the Northwest and Yukon Territories, most communities with a population of less than 1,000 only have grades one to nine, such as Baker Lake, Cambridge Bay, and Coppermine, N.W.T. Tungsten, N.W.T., a company town with a population of 295, has two teachers instructing grades one to nine. Faro, Yukon (population 1,471) has instruction for grades one to twelve but no vocational training facilities.¹⁰³

With small communities there is also a problem with the turnover and recruitment of teachers.¹⁰⁴ Lucas noted the problem as follows:

"High turnover of teachers in a single-industry community suggests that the communities are paying a high price for inexperienced teachers and the teachers are mostly inexperienced. These teachers do not and are not able to take on major roles in the community outside school, if for no other reason than the day-to-day preparation for classes, and the marking of assigned work is more than a full time job for a new teacher"¹⁰⁵

A survey of education in the Northwest Territories supports Lucas' statement. The report recommended hiring southern teachers only after they have one or preferably two years of teaching experience in southern

¹⁰² Lucas, p. 282.

¹⁰³ Wood, pp. 11, 12, 16, 22, 27, 44, 69.

¹⁰⁴ Gainer and Auld, p. 36.

¹⁰⁵ Lucas, p. 286.

Canada because "past experience indicates that northern teaching problems are often too numerous and difficult to be handled by teachers who are beginning their career."¹⁰⁶ In the north, there is also the problem of cultural differences among the children and the related educational expectations of the parents. The southerners want their children educated to southern standards to prepare them for living or furthering their education in the south. Northern natives want an education for their children that is relevant to the life in the north. These "opposing cultural pressures result in a compromise not very satisfactory to either group."¹⁰⁷

4d. Medical Services

Medical services for the single status community would normally consist of a person qualified in first aid or perhaps a nurse or medical assistant. Facilities would be limited and may consist of a treatment room, office and/or medical storeroom. Persons with serious illnesses or injuries are usually evacuated by air to a southern hospital.¹⁰⁸ For the employee in a short term community, minor ailments can be temporarily treated until the individual returns to his home community to obtain the services of a doctor or hospital. The employee's family, living in a large urban centre, would have a full range of medical services to draw on.

The family community with a small population would generally

¹⁰⁶ Survey of Education, Northwest Territories, 1972, Department of Education, Government of the N.W.T., Yellowknife, N.W.T., 1972, p.79.

¹⁰⁷ Ibid, p.2.

¹⁰⁸ Janet McIvor, "Flying to Work", The Canadian Nurse, December 1977, p.36.

have limited medical services.¹⁰⁹ Faro, Yukon (population 1,471) has a six bed hospital with one doctor, three nurses, and an ambulance. Cambridge Bay, N.W.T. (population 846) has a nursing station with one doctor and four nurses to help it serve a hinterland of smaller settlements. Very small communities like Tungsten, N.W.T. (population 295) have only a medical clinic run by the company plus bi-monthly visits by a doctor from Watson Lake.¹¹⁰

The lone physician in a community has difficulties not normally encountered in a large urban centre. Patients believe the doctor should have complete and personal interest in their welfare; that he should be always on call when needed and that there should be an alternative expert available at all times. Also, a number of residents "are convinced that small town practitioners are inadequate, otherwise they would be in the city." The doctor's close relationship with his patients and his dedication often prevent him from leaving the community for vacations or professional reasons. "The lone doctor in an isolated community not only misses colleagues for consultation, but also the informal shop talk and exchange of medical case histories which are so important in the informal continuing education of medical practitioners. Further the practice of medicine has to be carried on without the benefit of the all important medical team, elaborate facilities, and supporting services."¹¹¹ In a doctorless community, the nurse is called upon to provide medical services that are rarely required of a nurse in an urban

¹⁰⁹ Riffel, p.42.

¹¹⁰ Wood, pp.16, 27, 69.

¹¹¹ Lucas, pp.250, 251, p.253 quoting Jean Burnet, Next Year Country (Toronto 1951), p.114.

hospital. High turnover of medical staff is not uncommon in small communities which affects the continuity of medical services to the residents.¹¹²

Dental services would be almost non-existent unless the family community also served as a regional centre for a hinterland of small settlements. For small communities without a dentist, dental services are obtained by travelling to the nearest dentist or by having a dentist visit the community on a pre-arranged schedule. For the single status community, the employees would obtain dental services when they return home. Emergency cases would normally be flown out on the first scheduled aircraft. If the employee's family lives in a large urban centre, a full range of dental services would be available when required.

In the regional centre, emergency services are readily available at all hours without having to send for the doctor after normal working hours, which would be the case in the family community. Although urban residents have a choice of "a wide range of medical generalists and specialists, the choice of a doctor is made on irrational and non-specialist laymen's grounds, usually the recommendation of a friend or neighbour."¹¹³ The manner in which choice is exercised may be irrelevant but it is important to the residents to perceive they have a choice, even if it is exercised irrationally.

4e. Goods and Services

The availability of goods and services is quite different for the single status and family communities. With employees rotated

¹¹² Lucas, pp.247, 258, 259, 260, 267.

¹¹³ Lucas, p.403.

weekly, the short term community's need for goods and services would be very limited. Any store would be operated on a part-time basis for the supply of toiletries, cigarettes, candy, and stationery. At Rabbit Lake, the employees have a commissary and dispensing machines for snacks.¹¹⁴

For the long term community, the store would be operated full or part-time depending on the population. Due to the longer stay of personnel, a wider variety of goods would be available such as clothing, camera equipment and supplies, hobby kits, souvenirs, and records.

For a family community, the commercial facilities are larger and more varied. At present, large town centre complexes containing commercial, recreational, and educational facilities are favoured. Such complexes have been built in Churchill and Leaf Rapids, Man., Fermont, P.Q. and one is planned for Resolute Bay, N.W.T.

The family community normally requires the following commercial facilities: groceries, clothing, hardware, drugs, hotel, restaurant, bank, and automotive. The size of each facility would depend on the population to be served. For small populations, one store could sell groceries, clothing, hardware, non-prescription drugs, gas and oil, and perhaps some automotive supplies. Understandably, variety would be quite limited. Some facilities may be completely absent such as clothing, hardware, and banks. In such cases, residents would rely on mail order service or periodic shopping trips to large urban centres to satisfy their needs. The local store may perform some banking functions

¹¹⁴ Nogas (1976), p. 128.

such as cashing cheques and the deposit of savings. The Hudson's Bay stores in northern communities generally let people deposit their cheques at the store and draw on it for purchases or cash.¹¹⁵ In some communities such as Nanisivik, N.W.T., a flying bank service is provided one day per week.¹¹⁶

Where the market is insufficient for automotive related business such as the sale of fuel and oil, the single major employer will often sell fuel and oil to residents for their vehicles. Vehicle repairs are usually performed by the major employer's mechanics after working hours, sometimes using the major employer's repair facilities. Due to an absence of private motor vehicles in the single status communities, commercial automotive servicing and repair shops would not be required.

Since personnel visiting the single status community would be working directly or indirectly for the single employer, they would be accommodated in visitor's rooms in a motel type accommodation building. There would be no need for a hotel since visitors would not be on a "pleasure" trip. With meals provided free or at subsidized prices in the dining hall, there is no need for a restaurant.

The size and nature of the population will affect the presence and size of liquor outlets or beverage rooms. Due to the problems caused by alcohol consumption, some communities such as Fort Rae and Lac la Marte, N.W.T., have voted against the sale of liquor in their

¹¹⁵ Glen B. Warner, "Strathcona Sound, Social Implications and Suggestions with reference to the Primary Aggrement", Yellowknife, N.W.T., April 1975, p.68; Hobart, p.151.

¹¹⁶ Banker flies in from Resolute Bay and operates out of RCMP office. This arrangement was in effect the summer of 1977.

community.¹¹⁷ However, residents who desire alcohol may still order it from near-by communities where it is sold. In some small communities, liquor is sold by the store, usually a Hudson's Bay store. Quantities per person and hours when liquor may be purchased are often restricted by the community council which is the case in Cambridge Bay.

For a small family community, the beverage room would normally be part of a hotel or restaurant. Depending on the amount of business, live entertainment might be provided nightly or weekly. Where beverage rooms are absent, this function is normally provided by informal house parties in the residents' homes.

For the single status communities, the major and perhaps most important (to the residents) commercial establishment is the beverage room or "canteen". This is normally run by employees during their off-duty hours, or by the major employer. Here the employees can relax, listen to music, watch T.V., socialize, play such games as cards, darts and shuffleboard or consume alcoholic beverages. In a survey of southern workers at Arctic oil exploration camps, it was suggested that beer or bar services be provided after work inspite of the potential problems associated with combining alcohol and a high risk work activity.

Charles W. Hobart provided the following justification:

"... for many people beer is more powerfully associated with relaxation and conviviality than perhaps any other activity; as such it might be a powerful and effective way of helping to reduce absenteeism by helping men to relax after work, and to develop the spirit of comradeship and companionship which can reduce absenteeism"¹¹⁸

¹¹⁷ Thomas R. Berger, Northern Frontier, Northern Homeland, The Report of the MacKenzie Valley Pipeline Inquiry: Volume One, James Lorimer and Co., Toronto, 1977, p.156.

¹¹⁸ Hobart, p.15.

The presence of such a facility eliminates the need for employees to bring in their own alcoholic beverages for consumption in the privacy of their rooms. Drinking with friends and fellow workers enables some measure of informal social control over workers who might drink to excess.

A barbershop and/or hairdresser would not be required for the short term community since personnel would have access to this facility in their home community. For the long term community, such a facility is required. It may take the form of a dedicated room such as at Alert or a room which serves other purposes such as a bedroom or lounge. The barber is usually a fellow worker who is adept with hair cutting tools and cuts hair as a sideline. For the family community, barbershop and hairdresser services may be provided full time in a proper shop or part time in someone's home.

Facilities for religious worship in many of the single enterprise communities are often quite limited. Sometimes a local facility such as the theatre or auditorium is used for visiting clergy to perform religious services. Leaf Rapids has only one church (Roman Catholic) but five church groups meet regularly. Fermont also has only one church.¹¹⁹ In Nanisivik there are no organized church groups or facilities as yet.¹²⁰ For the single status communities, religious services are not usually available. At Alert, a clergyman visits once or twice annually. Religious services would normally be available in the home community for the family.

119

Inventory Report 1976 for Resource Community Development, pp.4-10, 9-15.

120

Underwood McLellan and Associates, "Nanisivik Genral Development Plan" for the Government of the Northwest Territories, Yellowknife, N.W.T., Edmonton, Alberta, April, 1977, p.26.

5. Mental Health

Mental health was not used as a factor in the evaluation due to the duplication of indicators with other factors. However, it is described here due to its interaction with the other factors such as isolation, physical environment, and interpersonal relationships.

Residents of isolated communities are often thought to be under mental stress due to the isolated nature of the community. Siemens lists the symptoms of such stress: "mental health problems especially depression; alcoholism and drunkenness; extreme loneliness; feelings of insecurity and uncertainty resulting from a state of "tentativeness" or "transiency"; "cabin fever" also called "housewife psychosis" and crowding"; promiscuity; and suicide--accident--injury--violence."¹²¹ Some of these symptoms are not peculiar to isolated communities while others would relate to the demographic characteristics of the population and the development stage of the community.¹²²

Two studies of northern residents in small communities have shown that "it appears as if during winter most northerners rather than merely white females have all kinds of problems rather than merely psychological ones and even the psychological problems which do occur are much the same as those found in southern Canada."¹²³ "However, for many people these problems appear to be much more acute due to the severe climate, the isolation, and the lack of adequate facilities in many

¹²¹ Siemens (1976), p.286.

¹²² Lucas, Ch. 2-5 describes the four stages of development as construction of the community, the recruitment of citizens, transition and maturity; Riffel, pp.12, 13, describes seven stages of development: natural or pre-discovery, prospecting to survey, industrial and town construction, industrial operation and community improvement, industrial and community operation, community diversification and community maturity.

¹²³ MacKinnon and Neufeldt; Nickels and Ledger, p.57.

communities."¹²⁴ As a result, isolate northern communities have a more acute "need for a full range of high quality services and public amenities."¹²⁵

Problems such as alcoholism, drunkenness and promiscuity can often be attributed to the nature of the community. For example, Churchill, Manitoba and Inuvik, N.W.T. each have the above problems and have a large number of unemployed residents, predominantly natives and transient white single males who have not been successfully integrated into the community. The majority of problem people come from these two groups.¹²⁶

When Hay River, N.W.T. was involved in a "Work Arctic" program which reduced unemployment, the rates of crime and alcoholism dropped to an all time low. "Both before and after the existence of the 'Work Arctic' program, the crime and alcoholism rates in Hay River were among the most catastrophically high in the North."¹²⁷

The high death rate attributed to accidents, injuries and violence may be related to the high consumption of alcohol which affects human reactions in preventing accidents or injuries and also tendencies towards crime and violence among both natives and non-natives. Another contributing factor to violent crimes may be the ready availability of firearms which are for hunting and protection from bears.¹²⁸

124

Boyce Richardson, The Future of Canadian Cities, New Press, Toronto, 1972, p.244; MacKinnon and Neufeldt, p.5; Mid-Canada Report, p.6; Riffel, p.42.

125

MacKinnon and Neufeldt, p.6.

126

A.M. Ervin, New Northern Townsmen in Inuvik, Department of Indian Affairs and Northern Development, Northern Development Research Group, Ottawa, Ontario, 1968; Peter Douglas Elias, Metropolis and Hinterland in Northern Manitoba, Manitoba Museum of Man and Nature, Winnipeg, Manitoba, 1975; Riffel, pp.49, 58.

127

Colin Alexander, Angry Society, Yellowknife Publishing Company Ltd., Saskatoon, Saskatchewan, 1976, pp.114, 115.

128

Abbott and Kehoe, p.9.

In his inquiry, Mr. Berger notes the increase in social problems such as alcohol abuse, crime, violence and family breakdown when industrial development or wage labour is introduced in an area where natives live in a somewhat traditional manner. These problems result from a conflict between the values and expectations of the industrial system and the native values and economy.¹²⁹ Sincere involvement of local natives in planning development in their area could reduce many of the social problems. Consultation should not be "desultory" or "tokenism" as was the case in Arctic Bay, N.W.T. when Nanisivik was being planned.¹³⁰

For the short term community, mental health should not be much of a problem since the workers are separated from their families for only a short period of time, usually seven days. The Rabbit Lake employees have some minor problems, however. Inexperience in dealing with large paycheques has resulted in the squandering of money and sometimes prolonged "drunks", usually by natives.¹³¹

The use of leisure time also poses a problem especially in the home community. Once the chores around the house such as appliance and vehicle repairs and home improvements are all done, one must find other interests, either hobbies or recreation to fill one's leisure time.¹³² Failing this, the employee may turn to alcohol or even part-time employment to pass the time. Gulf Minerals discourages part-time employment for its Rabbit Lake employees since it defeats the recreative aspect of

¹²⁹ Berger, vol. 1, pp.148, 149, 152, 153.

¹³⁰ Robert B. Gibson, "The Strathcona Sound Community: Lessons from Preliminary Planning", Contact: New Communities in Canada, NEP Pressman (ed), University of Waterloo, 1976, pp.324, 328.

¹³¹ Gainer and Auld, Appendix D, p.3.

¹³² "Rabbit Lake Staffed by Air Bus System", The Northern Miner, March 17, 1977, p.15.

the week off, reduces time for family life and exposes the employee to the possibility of injury while on another job.¹³³

Boredom at the work site would not be too much of a problem, especially if the employees worked an 11 hour day as they do in Rabbit Lake. At Rabbit Lake, employees can pass their leisure hours in either the recreation room which includes table tennis, pool tables, shuffleboard, darts, and an exercise area; the movie theatre or the pub.¹³⁴

For the long term community, mental health increases in significance over that of the short term community. The isolation and the separation from family and friends contribute to feelings of depression and irritability especially in winter with its prolonged cold and lack of sunlight. In Antarctica, Rohrer noted that in small groups at isolated stations, survival to return "home" becomes dominant and produces a remarkable degree of control of interpersonal relationships.¹³⁵

The climate and barrenness of isolated Arctic and even Antarctic settlements deprive personnel of sensory stimuli which can produce mental stresses in the individual. The type and degree of mental stress would vary with the individual and his ability to adapt mentally and physically to his environment. Sensory deprivation could produce such effects as "severe boredom, restlessness, disorientation in time, tension, intense need for privacy, aggression, irritability, poor concentration, lack of motivation, and possible emotional and social deterioration.

¹³³ Scott, p.10.

¹³⁴ Nogas (1976), p.128.

¹³⁵ Quoted in David McK. Rioch, "Psychiatric Problems of Man in the Arctic", Man Living in the Arctic, Proceedings of a Conference, Quartermaster Research and Engineering Centre, Natick, Massachusetts, 1-2 December 1960, Edited by Frank W. Fisher, National Academy of Sciences, National Research Council, Washington, D.C. 1961.

Such effects are usually more pronounced in winter with its storms, cold, and periods of continuous darkness."¹³⁶

The climate and isolation also reduce peoples' sense of security. There is the continual danger of fire. The availability of complete medical services is often hours away and is dependent on weather and the availability of aircraft. McK. Rioch considers "the narrow margin between comfortable effectiveness and disaster" as one of the four major stresses man is subjected to in the Arctic.¹³⁷ As well, a person may worry extensively about family problems back home which may be illness, emotional, financial or some other problem.

Mental health could have been compared using the degree of choice residents have to escape from stress-inducing factors but this would be a duplication of factors previously discussed. For the single enterprise community, these factors include isolation, severe climate, lack of facilities, family separation, observability, and lack of mental health services. There are also stress inducing factors in the urban setting. These include tension due to the faster pace of activities, traffic congestion, lack of contact with nature and outdoor recreation, massive buildings out of scale with humans, noise and air pollution, and anonymity in interpersonal contacts.¹³⁸ Many of these factors are related directly or indirectly to the quality of life characteristics discussed earlier in this appendix.

¹³⁶ Boag; Nelson; Marani, Rounthwaite, and Dick, para. c.3(1); G. Palmi, "Psychological Aspects of Transient Populations in Antarctica", and Niilo Pesonen, "The Organization of Health Services in Arctic Areas", both in Medicine and Public Health in the Arctic and Antarctic, Selected Papers from a Conference, World Health Organization, Geneva, 1963.

¹³⁷ McK. Rioch; other major stresses were cold, isolation, and the need to change to a new set of personal patterns of interpersonal relations.

¹³⁸ Cappon and Roche, pp.39-49; Lucas, p.6.

6. Native People

The culture, lifestyle, values, and expectations of the future residents could greatly alter the results of an evaluation of alternative community types. Differences in these aspects of the residents may be noted between Euro-Canadians and natives as well as urban and rural variations of these two resident groups. A distinction between urban and rural natives is required since the urban native has had greater opportunity for exposure to the urban Euro-Canadian way of life and has likely adapted to it. In contrast, the rural native would likely be living a more traditional lifestyle involving hunting and fishing to some extent plus government assistance programs. The effect of rural natives as a component of the community population will be briefly discussed for information purposes since their lifestyle, culture, values, and expectations would provide the greatest contrast to those of urban Euro-Canadians. This could alter the results of the evaluation.

Governments and private enterprise are making efforts to bring natives into the wage economy when new developments occur near existing native settlements. Thus the population of new communities can be expected to have an increasing proportion of rural natives. Culture and linguistic differences will require special attention to successfully integrate natives into both the workforce and the community.

For the family community, the native worker would have very limited opportunity to pursue a traditional life style due to restricted working hours. Natives used to living off the land often find working regular hours under supervision difficult to get accustomed to.¹³⁹

¹³⁹ Arctic Alternatives, A national Workshop on People, Resources and the Environment North of 60 at Carleton University, Ottawa, May 24-26, 1972, Douglas H. Pimlott, Kitson M. Vincent and Christine E. McKnight (ed), Canadian Arctic Resources Committee, Ottawa, 1973, p.180; Ervin, pp.7, 18, 19.

Natives used to a bush culture find the white man's ways and modern ways of living confusing and hard to understand. This causes many social and family problems among the natives.¹⁴⁰ Such problems can result in the natives quitting and moving back to their previous home, despite being generally considered as good workers and good neighbours in the community.¹⁴¹ As a result extra social services, especially counselling would be required.¹⁴²

In Leaf Rapids, the Ta-wow project provides information, assistance, and counselling for native workers and their families. In the early stages of operation, the rate of turnover for the native labour force was below that of all other employees.¹⁴³ Natives are successfully employed in Arctic oil explorations but not without some difficulties in culture and language which require attention to make them part of an effective work force.¹⁴⁴ Arvik Mines Ltd. has been consulting with prospective native employees about development of a new mine on Little Cornwallis Island. Items discussed include facilities, terms of employment, and training. In addition, visits were made to the proposed mine site and a tour of the mine at Nanisivik to familiarize prospective

140

Ervin, pp.7, 8, 18, 21; Colin Alexander p.93; Berger, vol. 1, Ch. 8; Kenneth M. Lysyk, Edith E. Bohmer and Willard L. Phelps, Alaska Highway Pipeline Inquiry, Supply and Services Canada, Ottawa, 1977, p.99.

141

J.S. Matthiasson and W.S. Chow "Relocated Eskimo Miners" Occasional Papers No. 1, Centre for Settlement Studies, University of Manitoba, Winnipeg, Manitoba, October 1970, pp.48-51.

142

Scott, p.17; Gainer and Auld, Appendix D, p.3.

143

Linn and Stabler, pp.5-32, 5-33.

144

Hobart, Ch. II, IV; Colin Alexander, pp.69, 70.

native employees with a mining operation.¹⁴⁵ In Nanisivik, natives are expected to occupy 60% of the employment positions by 1981.¹⁴⁶

The short term community provides minimum disruption to the native way of life. The natives can "maintain their present place of residence and carry on in their traditional life-style, including hunting, fishing, and trapping" in their week off.¹⁴⁷ However, families disliked being separated even though the husband was frequently away on hunting trips prior to obtaining wage employment. However, the advantages of wage employment appear to outweigh the emotional price of separation in most cases.¹⁴⁸ Also, the northern native communities, which serve as a labour source, would likely be located closer to the work site than the regional centre. This could reduce commuting costs which could have a high impact on total economic costs. This may be offset by the provision or upgrading of airport facilities at the native communities.

The long term community would have a high impact on the natives due to the employee's prolonged absence from the home community. This severely limits the native's opportunity to provide for his family in the traditional ways. As well, the family becomes dependent on others in the community for the provision of traditional items and foodstuffs. This is not necessarily welfare, since the family can afford to pay the other natives in the community for these items. Due to very strong

145

J.E. Barrett and Associates, Ch. V.

146

Underwood, McLellan and Associates, p.18.

147

Nogas (1976), p.128; Gainer and Auld, Appendix D, p.3.

148

Hobart, pp.12, 161, 163, 170-172, 183, 201.

family relationships, it would be very difficult to attract northern natives to the work force. Even if attracted, the native worker turnover is expected to be very high.¹⁴⁹ Most natives surveyed for the Arvik Mines project preferred the idea of moving to the site rather than commuting weekly.¹⁵⁰ As a result, the long term community is considered the least suitable for native employment.

In spite of the problems of adaptation to a wage economy, natives, such as the Inuit, have expressed a desire for wage employment for some of their people but at the same time enabling those who wish to live off the land to do so.¹⁵¹

7. Conclusion

The purpose of the preceding discussion of quality of life factors was, as previously mentioned, to give the reader a "feel" for quality of life in isolated single enterprise communities. Depending on various factors such as site location, nature of the single enterprise, and the characteristics of the expected population, the list of quality of life factors relevant to the methodology can be increased or decreased as applicable.

149

Scott, pp.5, 16.

150

J.E. Barrett and Associates, p.56.

151

Inuit Tapirisat of Canada, Speaking for the First Citizens of the Canadian Arctic, Ottawa, May 1977, p.7; Berger, vol. 1, p.110.

Appendix B

TRANSPORTATION DATAAircraft DataBoeing 737 (model 200c)

Technical: ¹	Max passenger capacity (including baggage)	113
	Cargo capacity	28,000 lb.
	Range (max payload)	2,080 mi.
	Economy Cruising Speed	520 mph

Costs: ²	charter:passenger	\$5.21/mi.
	cargo	\$4.21/mi.

Fairchild F27

Technical: ¹	Max passenger capacity (including baggage)	40-44
	Cargo capacity	12,500 lb.
	Range (max payload)	912 mi.
	Economy Cruising Speed	267 mph

NAMC YS-11

Technical: ¹	Max passenger capacity (including baggage)	46
	Cargo capacity	14,660 lb.
	Range (approx)	680 mi.
	Economy Cruising Speed	281 mph

Costs: ²	charter:passenger/cargo	\$2.25/mi. \$6.95/hr.
---------------------	-------------------------	--------------------------

Freight Data³

Winnipeg to Lynn Lake (rail)	<u>\$/cwt</u>
min 30,000 lb. load	1.93
min 40,000 lb. load	1.74

Winnipeg to Leaf Rapids

(rail to Lynn Lake, truck to Leaf Rapids)	
min 30,000 lb. load	3.25
min 40,000 lb. load	3.05

- Sources: 1. John W.R. Taylor, (ed), Jane's All the World's Aircraft, 1968/69 edition, BPC Publishing Ltd., London, England, 1969, pp. 121-123, 234-236.
2. In conversation with Mr. Klassen, Transair Charter Service, Winnipeg, Man., 6 April, 1978.
3. CNR Winnipeg Office, 11 April, 1978.

Appendix C

Leaf Rapids: Facilities and Services

- Health - 8 bed hospital and clinic
- 2 doctors
- Recreation - curling rink, skating rink, gymnasium, theatre,
library, exhibition centre, camp grounds, ski chalet,
soccer field, baseball diamonds, running track
- Education - 625 student school (K-12)
- Cultural - museum
- Protection - Police - 4 RCMP
- Fire - 20 Volunteers, 1 truck
- 1 Ambulance
- Communication - Newspaper - 1 weekly
- Radio - Thompson
- T.V. - CBC Channel 6
- Post Office
- Telephone
- Transportation - Rail - CNR tri-weekly to Lynn Lake
- Bus - Grey Goose Bus Lines daily
- Air - Clam Air Ltd., 3 daily flights connecting with
Transair flights at Thompson and Lynn Lake
- Business & Professional Services-1 only of each of the following:
- Bakery, Bank, Credit Union, Beauty Shop, Barber Shop, Eating Place with beverage, Supermarket, Grocery Store, Meat Market, Liquor Commission Outlet, Electrical Appliance Shop, Dry Cleaner (agent), Drug Store, Catalogue Office, Hotel (44 rooms), Department Store, General Store, Motor Vehicle Dealer, Tire Service, Machine Shop, Lumber Yard, Building Contractor, Electrical Contractor, Painters & Decorators, Photographer, Florist (agent), Insurance & Real Estate, Travel Agency, Sporting Goods, Theatre, Taxi, Delivery Service, Accountant, Dentist and Optometrist (part-time)
 - 2 of the following:
 - Service Stations, Bulk Oil Dealers, Hardware Stores, Road Contractors, Plumbing & Heating Contractors, Doctors, Lawyers (part-time), Truck Rentals
 - 3 of the following:
 - Eating Places

Source: Manitoba Community Reports 1976; Inventory Report 1976 for Resource Community Development.

Appendix D

Rabbit Lake: Population of Labour Source Communities

<u>Community</u>	<u>Population</u>
Saskatoon	133,750 ¹
Prince Albert	26,269 ²
La Ronge	2,000 ³
Uranium City	2,156 ³
Stony Rapids	193 ³
Black Lake	557 ³
Fond du Lac	544 ³

Sources: 1. Canada Year Book 1976-77, Supply and Services, Ottawa, 1977.

2. The World Book Encyclopedia, Field Enterprises Education Corporation, Chicago, 1972, p.689.

3. Gainer and Auld, pp.3, 54.

SELECTED BIBLIOGRAPHY

- Abbott, A.P. and Kehoe, J.P., "Mental Health Practice in the Yukon", Canada's Mental Health, Vol. XX, No. 1, Jan-Feb, 1972, pp.4-10.
- Alexander, Christopher, "The Goodness of Fit and Its Source", Environmental Psychology: Man and his Physical Setting, Harold M. Proshansky, William H. Ittelson, Leanne G. Rivlin (editors), Holt Rinehart and Winston Inc., New York, 1970, pp.42-56.
- Alexander, Colin, Angry Society, Yellowknife Publishing Company Ltd., Saskatoon, Saskatchewan, 1976.
- Allman, Norah J., "Gulf's Rabbit Lake Mine Exceeding Rated Capacity", The Northern Miner, September 22, 1977.
- "Anvil", Anvil Mining Corporation Ltd. booklet.
- Arctic Alternatives, A national Workshop on People, Resources and the Environment North of 60 at Carleton University, Ottawa, May 24-26, 1972, Douglas H. Pimlott, Kitson M. Vincent and Christine E. McKnight (ed), Canadian Arctic Resources Committee, Ottawa, 1973.
- Atcheson, J.D., "Problems of Mental Health in the Canadian Arctic", Canada's Mental Health, Vol. XX, No. 1, Jan-Feb, 1972, pp.10-17.
- Bancroft, Clifford G., Mining Communities in British Columbia: A Social Infrastructure Analysis, for B.C. Department of Mines and Petroleum Resources, University of Victoria, January, 1975.
- Berger, Thomas R., Northern Frontier, Northern Homeland, The Report of the MacKenzie Valley Pipeline Inquiry: Volume One, James Lorimer and Co., Toronto, 1977.
- Blumenfeld, Hans, "Criteria for Judging the Quality of the Urban Environment", Occasional Paper No. 14, Faculty of Environmental Studies, University of Waterloo, Ontario, 1974.
- Boag, T.J., "The White Man in the Arctic", The American Journal of Psychiatry, Vol. 106, No. 6, December, 1952, pp.444-9.
- Bourassa, Paul J., "La Ville de Fermont", CIM Bulletin, Vol. 70, No. 780, April, 1977, pp.103-9.

Bowden, Don, Manitoba Hydro, Winnipeg, Manitoba, Interview, May 18, 1977.

Building Construction Cost Data, 1977, 35th ed., Robert Snow Means Co. Inc., Duxbury, Mass., 1976.

Burke, C.D. and Ireland, D.J., "Holding the Line: A Strategy for Canadian Development", Urban Prospects, Ministry of State for Urban Affairs, 1976.

Canada's North 1970-1980, Department of Indian Affairs and Northern Development, Information Canada, Ottawa, 1972.

Canadian Statistical Review, January 1978, Vol. 53, No. 1, Statistics Canada.

Cappon, Daniel with Roche, Mary, "A Catalogue of Stress and Strain, Habitat Vol. 19, Nos. 5/6, 1976.

Clunie, David, "Two New Northern Communities, Contact: New Communities in Canada, N.E.P. Pressman (ed), University of Waterloo, August, 1976, pp.305-315.

Crain, Alan J. and Stamm, Caroline S., "Intermittent Absence of Fathers and Children's Perceptions of Parents", Journal of Marriage and the Family, Vol. 27, No. 3 August, 1965, pp.344-7.

Cram, John M., "Differential Need Satisfactions of Mine Workers in Northern Canada", Canadian Journal of Behavioural Science, Vol. 4, 1972, pp.135-145.

Davidoff, Paul and Reiner, Thomas A., "A Choice Theory of Planning", A Reader in Planning Theory, Andreas Faludi (ed), Pergamon Press, Oxford, England, 1973, pp.11-39.

Elias, Peter Douglas, Metropolis and Hinterland in Northern Manitoba, Manitoba Museum of Man and Nature, Winnipeg, Manitoba, 1975.

Ervin, A.M., New Northern Townsman in Inuvik, Department of Indian Affairs and Northern Development, Northern Development Research Group, Ottawa, Ontario, 1968.

Fox, Karl A., Social Indicators and Social Theory, John Wiley and Sons, New York, 1974.

Fried, J., "Settlement Types and Community Organization in Northern Canada", Arctic, Vol. 16, No. 2, June, 1963, pp.93-100.

- Fried, J.K. and Jessop, W.N., Local Government and Strategic choice: An Operational Research Approach to the Process of Public Planning, Tavistock Institute of Human Research, 1969.
- Friedmann, John, "Planning as a Vocation", Plan Canada, Vol. 6, No. 3, 1966.
- _____, Retracking America, Anchor Press/Doubleday, Garden City, New York, 1973.
- Ganier, Ray and Auld, Hedley, "Economic Base Study, Uranium City, Saskatchewan", report for the Airports and Properties Branch of the Ministry of Transport Central Region, September, 1966.
- Gertler, Len and Crowley, Ron, Changing Canadian Cities: The Next 25 Years, McClelland and Stewart Limited, Toronto, 1977.
- Gibson, Robert B., "The Strathcona Sound Community: Lessons from Preliminary Planning", Contact: New Communities in Canada, N.E.P. Pressman (ed), University of Waterloo, 1976, pp.321-331.
- Gourdeau, Eric, "The Dilemma", The Arctic Dilemma: Man and His Environment Versus Resource Development, The Arctic Institute of North America, Montreal, January, 1971.
- Grouette, P., employee of Anvil Mines, Faro, Yukon, during visit to Winnipeg, Manitoba, Interview, 10 May, 1978.
- Harland, Douglas G., "Health and Welfare Indicators: Current Canadian Research", Social Indicators, Workshop Papers presented at the Canadian Conference on Social Welfare, Laval University, Quebec City, June 18-22, 1972.
- Herzog, Elizabeth and Sudin, Cecelia E., "Fatherless Homes", Children, Vol. 15, No. 5, Sept-Oct, 1968, pp.177-182.
- Hill, Morris, "A Goals-Achievement Matrix for Evaluating Alternative Plans", Decision-Making in Urban Planning, Ira M. Robinson (ed), Sage Publications Inc., California, 1972, pp.185-207.
- Hobart, Charles W., "Employee Adjustment and Effectiveness: Arctic Oil Explorations of Gulf Oil Canada 1973-74" Westrende Institute, Edmonton, Alberta, 1974.
- International Surveys Limited, "An Analysis of Eight Group Discussions on a Proposed Employment and Accommodation Plan for a New Mining Development in Northern Saskatchewan", Prepared for Gulf Minerals Canada Ltd., April, 1972.

- Inuit Tapirisat of Canada, Speaking for the First Citizens of The Canadian Arctic, Ottawa, May, 1977.
- Inventory Report 1976 for Resource Community Development, Ministry of State for Urban Affairs, Ottawa, March, 1977.
- Ivanovic, Branislav, "A Method of Establishing a List of Development Indicators", Social Indicators: Problems of Definition and Selection. UNESCO Press, France, 1974.
- Jackson, J.E. Winston and Poushinsky, Nicholas W., Migration to Northern Mining Communities: Structural and Social-Psychological Dimensions, Centre for Settlement Studies, University of Manitoba, Winnipeg, Manitoba, 1971.
- J.E. Barrett and Associates, "The Polaris Project and the Inuit", Vancouver, B.C., November, 1976.
- "Leaf Rapids called 'Silly Town' that's an Economic Mistake", Winnipeg Free Press, March 31, 1978, p.15.
- Legget, R.F. and Dickens, H.B., Building in Northern Canada, Technical paper No. 62 of the Division of Building Research, National Research Council, Ottawa, March, 1959.
- Lichfield, Nathaniel, Kettle, Peter, and Whitebread, Michael, Evaluation in the Planning Process, Pergamon Press, Oxford, England, 1975.
- Linn, H.D., and Stabler, J.C., "Economic, Social and Planning Requirements for Northern Communities", Saskatoon, Saskatchewan, March, 1976.
- Lotz, Jim, Northern Realities, New Press, Toronto, 1970.
- Lucas, Rex A., Minetown, Milltown, Railtown, University of Toronto Press, Toronto, 1971.
- Lynn, David B. and Sawrey, William L., "The Effects of Father Absence on Norwegian Boys and Girls", Journal of Abnormal and Social Psychology, Vol. 59, 1959, pp.258-262.
- Lysyk, Kenneth M., Bohmer, Edith E., and Phelps, Willard L., Alaska Highway Pipeline Inquiry, Supply and Services Canada, Ottawa, 1977.
- MacKinnon, A.A. and Neufeldt, A.H., "A Survey of Mental Health 'North of 60' ", Canada's Mental Health, Vol. XXII, No. 1, Jan-Feb, 1974, pp.3-6.
- MacMillan, J.A., Tulloch, J.R., O'Brien, D., and Ahmad, M.A., Determinants of Labour Turnover in Canadian Mining Communities, Centre for Settlement Studies, University of Manitoba, Winnipeg, Manitoba, May, 1974.

- Manitoba Community Reports, Government of Manitoba, Industry and Commerce, Winnipeg, Manitoba, September, 1976.
- Marani, Rounthwaite, and Dick, CFRS Alert N.W.T. - Environmental Study, Report to the Department of National Defence, 7 May, 1971.
- Matthiasson, J.S., Resident Perceptions of Quality of Life in Resource Frontier Communities, Centre for Settlement Studies, University of Manitoba, Winnipeg, Manitoba, 1970.
- _____, "Resident Mobility in Resource Frontier Communities: An Examination of Selected Factors", Two Studies of Fort McMurray, Centre for Settlement Studies, University of Manitoba, Winnipeg, Manitoba, October, 1971.
- Matthiasson, J.S. and Chow, W.S., "Relocated Eskimo Miners" Occasional Papers No. 1, Centre for Settlement Studies, University of Manitoba, Winnipeg, Manitoba, October, 1970.
- McIvor, Janet, "Flying to Work", The Canadian Nurse, December, 1977, pp.34-6.
- McK. Rioch, David, "Psychiatric Problems of Man in the Arctic", Man Living in the Arctic, Proceedings of a Conference, Quartermaster Research and Engineering Centre, Natick, Massachusetts, 1-2 December, 1960, Frank W. Fisher (ed), National Academy of Sciences, National Research Council, Washington, D.C. 1961.
- Mid-Canada Report, Mid-Canada Development Foundation Inc., 1971.
- "Miners Stress Job Security", Winnipeg Free Press, February 27, 1978, p.13.
- Moss, A.E., "Design for Northern Communities" The Developing North, Transactions of the Third Northern Conference, Whitehorse, Yukon, 1969.
- MPS Associates and Canalog Logistics Ltd., "Cost of Transporting Goods into the MacKenzie Valley" prepared for Arctic Transportation Agency of Transport Canada, July, 1977.
- Nadeau, Michel, "Fermont OÙ Le Nôrd Québécois Apprivoise", North, Vol. XXIV, No. 1, Jan-Feb, 1977, pp.16-9.
- Nelson, Paul, "Human Adaptation to Antarctic Station Life", Medicine and Public Health in the Arctic and Antarctic, Selected Papers from a Conference, World Health Organization, Geneva, 1963.

- Nickels, James, B., (ed), Studies of Expected and Effected Mobility in Selected Resource Frontier Communities, Centre for Settlement Studies, University of Manitoba, Winnipeg, Manitoba, 1976.
- Nickels, James B. and Kehoe, John P., Northern Communities: Mental Health and Social Adaptation, Centre for Settlement Studies, University of Manitoba, Winnipeg, Manitoba, December, 1972.
- Nickels, James B. and Ledger, Jack, Winter, Wilderness and Womanhood: Explanations or Excuses for Mental Health Problems, Centre for Settlement Studies, University of Manitoba, Winnipeg, Manitoba, 1976.
- Nickels, J.B. and Sexton, D.L., "Use of Quality of Life Factors to Predict Residents' Intentions to Remain in Resource Frontier Communities", Studies of Expected and Effected Mobility in Selected Resource Frontier Communities, James B. Nickels (ed), Centre for Settlement Studies, University of Manitoba, Winnipeg, Manitoba.
- 1975 Dodge Construction Systems Costs, McGraw Hill Information Systems, New York, 1974.
- Noakes, P.J., "Development of a Stable Social Unit at the Black Angel Mine", CIM Bulletin, Feb, 1978, pp.52-9.
- Nogas, F.R., "Fly-In Program at Rabbit Lake" CIM Bulletin, Vol. 69, No. 774, October, 1976, pp.125-8.
- Nordlund, R.V., "Settlement Planning in the Arctic", MCP Thesis, University of Manitoba, Winnipeg, Manitoba, 1972.
- Northward Looking: A Strategy and a Science Policy for Northern Development, Science Council of Canada, Report No. 26, Supply and Services Canada, Ottawa, August, 1977.
- Palmai, G., "Psychological Aspects of Transient Populations in Antarctica", Medicine and Public Health in the Arctic and Antarctic, Selected Papers from a Conference, World Health Organization, Geneva, 1963.
- Palys, T.S., "Social Indicators of Quality of Life in Canada: A Practical Theoretical Report", Manitoba Department of Urban Affairs, Winnipeg, Manitoba, August 2, 1973.
- Parker, V.J., The Planned Non-Permanent Community, Department of Northern Affairs and Natural Resources, Northern Coordination and Research Centre, Ottawa, 1963.

- Paterson Planning and Research Ltd., "Life Style Preferences of Rural Non-Farm Residents", R.M. of Springfield, Manitoba, prepared for Municipal Planning Branch, Dept. of Municipal Affairs, Manitoba, Toronto, April 1973.
- Pearson, Norman "Livability Indicators" Social Indicators, Proceedings of a Seminar, January 13-14, 1972, Ottawa, April, 1972.
- Pesonen, Niilo, "The Organization of Health Services in Arctic Areas, Medicine and Public Health in the Arctic and Antarctic, Selected Papers from a Conference World Health Organization, Geneva, 1963.
- Porteous, J. Douglas, "Quality of Life in British Columbia Company Towns: Resident Perceptions", Contact: (Special Issue) New Communities in Canada, N.E.P. Pressman (ed), University of Waterloo, Waterloo, Ontario, 1976, pp.332-346.
- _____, "Creating Cities for Northern Canadians", Habitat, Vol. 18, No. 415, 1975, pp.7-9.
- Pressman, Norman E.P., Planning New Communities in Canada, Ministry of State for Urban Affairs, Information Canada, Ottawa. 1975.
- _____, Social Planning Prerequisites for New and Expanded Communities", Contact: New Communities in Canada, N.E.P. Pressman (ed), University of Waterloo, Waterloo, Ontario, 1976, pp.170-188.
- Proceedings of the Symposium on Resource Frontier Communities, December 16, 1968, University of Manitoba, Centre for Settlement Studies, Winnipeg, Manitoba, 1968.
- "Rabbit Lake Staffed by Air Bus System", The Northern Miner, March 17, 1977, p.15.
- "Resource-Based or One-Industry Towns and the Natural Environment". Report on the Yellowknife Symposium sponsored by the Canadian Participation Secretariat for Habitat; United Nations Conference on Human Settlements, Vancouver, 1976, held at Yellowknife, N.W.T., September 12-13, 1975 (mimeographed).
- Richardson, Boyce, The Future of Canadian Cities, New Press, Toronto, 1972.
- Riffel, J.A., Quality of Life In Resource Towns, Ministry of State for Urban Affairs, Ottawa, 1975.

- Robinson, Ira M., New Industrial Towns on Canada's Resource Frontier, Dept. of Geography, University of Chicago, Research Paper No. 73, Chicago, 1962.
- Rose, Richard, "The Market for Policy Indicators", Social Indicators and Social Policy, Andrew Shonfield and Stella Shaw (ed), Henemann Educational Books, London, England, for Social Science Research Council, 1972.
- Schlesinger, Benjamin, The One Parent Family: Perspectives and Annotated Bibliography, University of Toronto Press, 1970.
- Scott, Colin, "A Preliminary Evaluation of the Gulf Minerals Rabbit Lake Commute as Regards Native Northern Employment", Occasional Paper No. 1, Dept. of Northern Saskatchewan, La Ronge, Saskatchewan, 11 September, 1975.
- "Shuttle Service for Workers", Regina Leader Post, September 4, 1976.
- Siemens, L.B., Single Enterprise Community Studies in Northern Canada, Centre for Settlement Studies, University of Manitoba, Winnipeg, Manitoba, December 1973.
- _____, "Single-Enterprise Communities on Canada's Resource Frontier", Contact: New Communities in Canada, N.E.P. Pressman (ed), University of Waterloo, Waterloo, Ontario, 1976, pp.277-297.
- Supplemental to the Dryden Observer, April 27, 1977.
- Survey of Education, Northwest Territories, 1972, Department of Education, Government of the N.W.T., Yellowknife, N.W.T., 1972.
- "The Northern Habitat", The Canadian Architect, November 1956. An adaptation by C. Ross Anderson of a document prepared by Ross Anderson, Frank Chapman, Peter Goering, Kunio Hidaka, Fraser Milne, Anthony Roberts, Peter Stokes and Jacqueline Tyrwhitt, pp.29-32.
- The One-Parent Family; Report of an Inquiry on One-Parent Families in Canada, The Canadian Council of Social Development, October, 1971.
- Underwood McLellan and Associates, "Nanisivik General Development Plan" for the Government of the Northwest Territories, Yellowknife, N.W.T., Edmonton, Alberta, April, 1977.
- Van Ginkel, Blanch Lemco, "New Towns in the North", Contact: New Communities in Canada, N.E.P. Pressman (ed), University of Waterloo, 1976, pp.298-308.

- Walters, Dorothy, "Social Intelligence and Social Policy", Social Indicators, Proceedings of a Seminar, January 13-14, 1972, Ottawa, April, 1972.
- Warner, Glen B., "Strathcona Sound, Social Implications and Suggestions with reference to the Primary Agreement", Yellowknife, N.W.T., April, 1975.
- Warnock Hersey International Ltd., Professional Service Division, "Arctic Transportation Study" for Department of Indian Affairs and Northern Development, The Northern Economic Development Branch (no date, estimate circa 1970).
- Watts, Griffis and McQuat Limited, Feasibility Study of the Strathcona Sound Project, 1973.
- West, W.R., "An Evaluation of Alternative Resource Community Plans by Cost Benefit Analysis", MCP Thesis, University of Manitoba, April, 1976.
- Wood, Donald G. (ed), Canada North Almanac, Vol. 2, Research Institute of Northern Canada, Yellowknife, N.W.T., January, 1976.
- Zrudlo, Leo, "Psychological Problems and Environmental Design" Conference on Building in Northern Communities: University of Montreal, May 7-11, 1973; Michael Glover (ed), Arctic Institute of North America, Montreal, P.Q., January, 1974.