FAIRBANKS NORTH STAR BOROUGH
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COMMUNITY INFORMATION CENTER

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FAIRBANKS PETROCHEMICAL STUDY

By

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FOREWORD

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Ms. Virgene Hanna performed magnificently as the project field director. As a result of her efforts, and the efforts of the 32 interviewers and coders she supervised, the field phase of the project was successfully completed ahead of schedule.

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Chapter One

INTRODUCTION

This report contains the results of work performed under Fairbanks North Star Borough Ordinance Number 7720II. The central objective of Ordinance Number 7720II is to assess the views of Fairbanks residents concerning petrochemical development in the Fairbanks North Star Borough. To achieve that objective, the Institute of Social and Economic Research at the University of Alaska initiated a study in January, 1978, which consisted of two major components. The first component involved the development of a comprehensive description of the most likely form of petrochemical development which could conceivably occur in the Fairbanks area. The description is based on a review of relevant technical and economic factors by a team of experts employed by the Institute. The second component of the ISER study consisted of a survey of Fairbanks residents which incorporated the petrochemical development description and met the rigorous sampling requirements necessary to insure that the results accurately reflect the views of all adults living in the Fairbanks North Star Borough.

The design of the petrochemical description and survey components of the study, in fact, reflects not only the overall study objective of assessing public attitudes concerning petrochemical development but also several specific sub-objectives. The results contained in this report can best be interpreted in the context of these sub-objectives so we have discussed each sub-objective in detail before the actual study findings are presented. Chapter One concludes with a brief summary of the results. Chapter Two presents the backup material that was used to generate the petrochemical description and Chapters Three through Seven contain a detailed discussion of the results of the survey. A description of the methods employed in conducting the survey and a copy of the questionnaire are included as Appendices A and B, respectively.

Sub-objective One: Presentation of a Description of Petrochemical Development

The topic of petrochemical development has appeared in over 20 articles in the Fairbanks Daily News-Miner in the past 2 months. While the public has been exposed to a vast amount of material on petrochemical development, the information has had the effect of increasing rather than diminishing the confusion which appears to surround public opinion on the issue. Even the most accurate reporting of statements and events cannot overcome the bewildering mix of facts, expert opinions and conjectures which broadly relate to the petrochemical industry. For this reason, it was felt that a simple polling of public opinion would do little to improve the information base used by the Borough

Assembly and Administration in the formulation of Borough policies regarding petrochemical development. The selected alternative approach has involved a substantial effort to clarify the meaning of petrochemical development as it pertains to the Fairbanks situation. While it is impossible to precisely project all the effects a petrochemical plant would have on the Fairbanks community, we have attempted to objectively review the set of technical, economic and environmental factors upon which public attitudes toward petrochemical development are based. This information has been presented to a scientifically selected sample of over 400 Fairbanks residents. We hope that the information will also become a focal point of discussion for the Fairbanks community as a whole. At the same time, we have designed the study in a way that will enable us to project what public attitudes would be regarding petrochemical developments which dramatically diverge from our own best estimates. Consequently, the results of this study should not become quickly outmoded as events transpire and new information is developed. Details about how the petrochemical development description was developed appear in Chapter Two. Public attitudes toward petrochemical development that are in part based on the petrochemical development description are discussed in Chapter Five.

Sub-objective Two: Assessment of Attitudes of the General Public Toward Petrochemical Development

It is important to remember that the petrochemical development description incorporated in the survey at best clarified the issue for two percent of the Fairbanks population. Even assuming that a successful community-wide information dissemination program is implemented, the majority of Fairbanks residents are likely to remain relatively uninformed about the changes that would be expected to result from a petrochemical development. If a referendum is conducted on the issue in the future, a substantial proportion of those voting may not have been exposed to a comprehensive description of the effects of the most likely petrochemical development in the Fairbanks area. It is, therefore, important to know the attitudes of potential voters who have not read or heard the petrochemical description. Because the survey sample accurately represents all Fairbanks residents, it is possible to meet this objective by asking a series of questions in the interview about petrochemical development before the petrochemical description is presented. In this way, the results of the survey reflect both the attitudes of the general public as well as the attitudes of a sample of the public that has been presented with detailed information about the most likely form of petrochemical development. Results reflecting the attitudes of the general public toward petrochemical development are presented in Chapter Four.

Sub-objective Three: Assessment of Expectations Concerning Petrochemical Development

Attitudes describe what people like or dislike about an object and

are based on the basic values a person holds and the information they possess about the object. Although the petrochemical development description is designed to provide a uniform set of information, people are at liberty to disagree with this information and base their attitudes on information from other sources. In addition, the survey also assesses public attitudes before the petrochemical description is presented. In both instances, we need to know what information people are actually using as a basis for their attitudes. This information can best be described as a set of expectations about the changes that would result from petrochemical development in the Fairbanks area. The survey thus includes not only measures of public attitudes toward petrochemical development but also measures related to what people expect from a petrochemical devllopment. A discussion of general public expectations regarding petrochemical development can be found in Chapter Four. Results reflecting expectations which have been revised on the basis of the petrochemical development description appear in Chapter Five.

Sub-objective Four: Assessment of General Growth Attitudes and Expectations

Attitudes and expectations concerning petrochemical development cannot be divorced from the more general set of attitudes and expectations concerning growth and change in the Fairbanks area. The potential effects of petrochemical development must be compared with the expected course of changes that will result from other sources of economic growth such as agriculture, tourism and other industries. Of course, a general assessment of attitudes and expectations toward growth not only establishes the necessary comparative perspective but also provides a valable body of information in itself. The results of this assessment appear in Chapter Three.

Sub-objective Five: Assessment of Current Fairbanks Economic Conditions

The Fairbanks Petrochemical Study is primarily oriented toward the future but the survey presents an opportunity to collect valuable information about the present as well. Since economic conditions in Fairbanks affect almost every Borough policy, a current assessment is included as a sub-objective of the study. The survey focuses in particular on the current employment status of the population with additional questions on housing, moving plans, and past and expected major purchases. Together, the results of these questions will present a detailed picture of the current level of economic well-being in the Fairbanks community.

A major survey of the type performed in this study also yields a variety of information which is ancillary to the central objectives of the study but extremely valuable in other contexts. One such information byproduct is a detailed breakdown of the current demographic characteristics of the Fairbanks population. Another is a listing of key concerns

people would like the Borough to know about. Information relevant to current economic conditions in Fairbanks and information not directly related to the central objectives of this study appear in Chapter Five.

Summary of Results

Survey results show that residents expect Fairbanks will continue to grow over the next ten years, but at a slower rate than that of the last several years. They believe that hunting and fishing opportunities and the quality of the air in Fairbanks have declined in recent years, and residents expect both community attributes to continue their decline at a moderate rate over the next ten years. Most other community attributes, such as the number of job opportunities, locally made products, new stores, and the amount of services provided by the Borough are only expected to increase slowly. Roughly a third of the Fairbanks population expect these attributes to remain at about current levels.

In responding to what specific changes they thought would occur over the next ten years in Fairbanks, most residents expected that undesirable[1] community attributes such as the amount of air pollution and population growth to increase more rapidly than such desirable attributes as the number of job opportunities and locally made products. However, when asked their overall expectations for change in Fairbanks, 76 percent of the population expected that Fairbanks would be just as good or a better place to live over the next ten years. The discrepancy is in part accounted for by the fact that slow increases in several desirable community attributes are considered more important than larger increases in some of the least desirable community attributes. Survey results also show that residents who are staying in Fairbanks primarily for economic reasons tend to expect the community to become a better place to live while those who are staying in Fairbanks primarily to take advantage of the surrounding wilderness environment tend to expect Fairbanks will become a worse place to live over the next ten years.

The results of the survey confirmed our expectation that few people agree about the direct effects of petrochemical development. While many residents believe that they are at least somewhat familiar with petrochemical development (69 percent), their expectations before being presented with our description of petrochemical development varied widely. For example, 26 percent of the population expects that a petrochemical facility would employ 100 or fewer persons, while 29 percent expect that over 500 persons would work at such a plant. Overall, most residents indicated that the primary effects of petrochemical development would be to create jobs, produce goods for local consumption and increase the amount of air pollution.

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[1] The desirability of community attributes was determined by the respondents themselves.

On balance, the same proportion of Fairbanks residents (29 percent) expect that a petrochemical plant would make Fairbanks a better place to live as expect it would make Fairbanks a worse place to live. Over a third of the population (35 percent) expected that petrochemical development would not affect their lives for the better or worse, and 7 percent simply did not know what to expect.

The description of petrochemical development presented to our survey respondents did have the desired effect of correcting much of the misinformation and reducing the confusion about petrochemical development. Several aspects of the description differed from general public conceptions about petrochemical development. First, the facility would cost more than residents would have expected and such a facility would add a substantial amount to the local tax base. Second, the construction of the plant would result in the employment of more people than most residents realized. Third, a petrochemical plant of the type most likely to be constructed in Fairbanks would not result in the smog initially expected by most residents. Finally, the plant would not result in many new products becoming available locally.

After being presented with the petrochemical development information, residents modified their expectations about resulting changes in 7 of the 14 major community attributes. They expected more rapid increases in the amount of taxable property, the quality of transportation links to Fairbanks, and in the amount of Borough services provided. In addition, they expected less rapid increases in the number of locally available products, the amount of air pollution, the number of new stores, and the number of jobs related to agriculture.

Respondents now expect that while there will be somewhat more growth with petrochemical development than without it, the growth will follow patterns similar to that expected to occur without the development.

Public attitudes on how such development will affect the quality of living in Fairbanks did not change substantially overall buy many individuals changed their attitudes after learning more about petrochemical development. The net result is that our informed sample of Fairbanks residents divided about equally (28 versus 26 percent) over whether petrochemical development would make Fairbanks a better versus worse place to live with 3 percent having no opinion. The remaining 43 percent of the sample did not expect petrochemical development to affect Fairbanks one way or the other. Nevertheless, most of the residents who did not expect petrochemical development to affect Fairbanks for better or worse tended to favor petrochemical development.

When asked whether the Borough should invite petrochemical companies to make proposals and if it should aid in developing information required by petrochemical companies, 67 percent of our respondents said yes. This question was asked after information was presented to the respondents on most likely effects of petrochemical development and thus reflects the attitude of an informed sample of the Fairbanks population.

It first appears strange that only 29 percent of the respondents

expect that petrochemical development would make Fairbanks a better place to live, while 67 percent favor the Borough's promotion of petrochemical development. The 38 percent difference is explained by the petrochemical development leanings of those who think petrochemical development would not change Fairbanks for better or worse.

Support for petrochemical development can be assumed in two ways. If we count those who would just as soon have petrochemical development as not, there is considerable support. However, as mentioned above, this support does not accurately reflect the number of people who actually expect Fairbanks living conditions to improve as a result of petrochemical development. Alternatively, if we count those who expect to gain as being for development and those who expect to lose as being against, the levels of support and opposition for petrochemical development are equal. However, this approach ignores the preferences of 43 percent of the population who expect to neither gain or lose should petrochemical development occur.

The survey results do not directly establish what Borough policy should be, but they do furnish a basis on which Borough policy can be formulated. Since there is not a concensus supporting or opposing development, an equitable solution would require a tradeoff between the views of 26 percent of the population who expect petrochemical development will make Fairbanks a worse place to live and 43 percent of the population who don't expect to gain or lose as a result of petrochemical development, but who support it anyway.

Apart from the question of whether the Borough should support, oppose or remain neutral with regard to petrochemical development, survey respondents were asked for their views on several specific actions that could be taken to increase the economic feasibility of petrochemical development. The results indicate that most Fairbanks residents would like to encourage petrochemical development as long as it does not cost much to do so. The public believes that the Borough should pursue such inexpensive activities as inviting companies to make proposals and providing them with information. However, the majority of Fairbanks residents does not support such possible economic incentives as tax breaks, the sale of municipal revenue bonds to help finance development, or the sale of State royalty gas at less than full value. The lack of support for these incentives appears to reflect the fact that most residents do not expect petrochemical development to make Fairbanks a better place for them to live. Roughly, a third of the population does expect petrochemical development to make Fairbanks a better place to live, and we repeatedly find that about a third of the population support incentives which involve some sacrifices.

The following chapters take a much closer look at the survey results. The above summary is only intended to highlight the most important findings; the residents of Fairbanks provided a great deal more information than we have been able to cover here and we hope that the detailed discussion forming the main body of this report is more successful in capturing the rich fabric of attitudes and expectations regarding growth in general and petrochemical development in particular.

Chapter Two

A DESCRIPTION OF PETROCHEMICAL DEVELOPMENT

Petrochemicals are defined as chemicals derived from petroleum raw materials, including natural gas. They are the basic building blocks for thousands of products such as fertilizers, plastics, fibers, paints, solvents and many varieties of rubber. Whether a petrochemical industry can be located in Fairbanks and what type of petrochemical development would be best suited for Fairbanks are questions which involve dozens of facotrs. Among them are: the type of petroleum raw materials available, the cost of these raw materials, the cost of building and operating the plant, the availability of skilled labor, water, land, services for employees and adequate transportation facilities, the location of markets for petrochemicals, the location of other chemicals which can be used in a petrochemical plant, the cost of transporting both the inputs to and outputs from the plant, the price and demand for petrochemical products, the presence of environmental constraints, zoning regulations, property and income taxes as well as an equally extensive list for all alternative uses of the raw materials in Fairbanks and elsewhere. The above enumeration is probably no more, or less, extensive than that which might be given for any major industry. It should serve to make the point, however, that a description of petrochemical development must be based on many assumptions about factors whose characteristics are still uncertain. The price of North Slope natural gas is unknown. Even the content of the gas that will ultimately be in the Northwest gas pipeline is in question. At the same time, world production and consumption of petrochemicals are expected to change rapidly in the next decade.

It is easy to see why discussions about petrochemical development involve many confusing and often contradictory statements. It is also clear that it is impossible to describe the exact form of petrochemical development which might occur in Fairbanks or even to say at this point whether it is technically and economically feasible to construct such a plant in the Fairbanks area. We can, however, formulate a reasonably concrete description of the most likely technically feasible and economically conceivable facility. The range of projected effects can be considerably narrowed from that which applies to the petrochemical industry as a whole. For example, we are talking about a gas-based and not oil-based petrochemical plant. A description of the effects of oil-based petrochemical plants is appropriate for Kenai or Valdez, not Fairbanks. Another example of how the range of effects can be narrowed concerns the petrochemical products that can be expected from a plant located in Fairbanks. There are clear economic reasons why such a plant cannot produce final products such as tires and molded plastics. The remainder of this chapter is devoted to a brief discussion of the basic concepts that are relevant to petrochemical development in Fairbanks, followed by a technical description of the more likely forms of petro-

chemical development and concluding with the text of the petrochemical development description that was presented to our survey respondents.

BASIC CONCEPTS - Feedstock Sources.

We have assumed that the Northwest Alaskan (NWA) gas pipeline will carry only "dry" gas, i.e., a mixture of methane and ethane with only traces of propane, butane and heavier hydrocarbons, and that a separate gas liquids pipeline would be required to transport significant quantities of propane and butanes to or beyond Fairbanks. The small quantities of natural gasolines (pentanes plus) extracted from the natural gas stream can be transported either in such a liquids pipeline or mixed with the crude oil in the Alyeska oil pipeline.

While it is technically possible to move "wet" gas in the NWA natural gas pipeline, or to dissolve propane and butanes in the crude oil stream for movement in the oil pipelines, the authorities we have consulted regard these alternatives as unlikely economically. Thus we have assumed that three main possibilities exist for petrochemical feedstock sources in the Fairbanks area based upon natural gas production from Prudhoe Bay.

The first potential source of feedstocks is to remove some portion of the dry gas stream (methane and ethane) from the NWA pipeline at Fairbanks and to use these gases for petrochemical manufacturing in about the proportion in which they will be mixed in the processed gas stream from Prudhoe Bay. Any excess of either gas resulting from an imbalance of plant requirements relative to the proportion of gases in the gas supply would be returned to the NWA pipeline for shipment out of Alaska.

The second potential source of feedstocks is to process a part of the dry gas stream at Fairbanks, removing ethane for petrochemical manufacture and returning the methane to the NWA pipeline for shipment out of Alaska.

The third potential source of feedstocks is liquids from a processing plant at Prudhoe Bay, moved by a gas liquids pipeline from Prudhoe Bay to or beyond Fairbanks. This liquids stream could be composed of ethane, together with propane and butanes (perhaps with some natural gasolines) or alternatively all or most of the ethane could be retained in or returned to the gas stream in the NWA pipeline at the processing plant.

For the purpose of planning a petroleum complex, a fourth feedstock option is a combination of the preceding, using methane and ethane drawn from the NWA gas pipeline at Fairbanks with ethane, propane and butane from a gas liquids pipeline.

BASIC CONCEPTS - Transportation of Feedstocks.

The NWA gas pipeline will carry a mixture mainly of methane and ethane, so that this pipeline can be a source of either or both. Thus, it would not require a separate transportation facility to make either feedstock available to a petrochemical plant in Interior Alaska. Ethane, however, could also be moved to Fairbanks in a 440-mile gas liquids pipeline along with some or all of the heavier gas liquids. Moving all of the ethane, butane and propanes corresponding to 2.0 billion cubic feet per day of pipeline gas would probably require an 18-inch pipeline. If the ethane were retained in the gas pipeline, a 12-to 14-inch pipeline would be required to move all of the available propane and butanes. Moving only the volumes of ethane, propane and butane required to serve a world-scale olefins (ethylene-propylene-butylene) complex would require an 8-to 10-inch pipeline. It is very unlikely that it would become economic to move gas liquids separately on any smaller scale.

BASIC CONCEPTS - Transportation of Petrochemical Products.

Most petrochemical products from Interior Alaska could be shipped either in a product pipeline or by rail. The larger volumes of methanol envisioned previously, however, conceivably could be shipped in batches through the trans-Alaska oil pipeline to Valdez.

Assuming that its output is entirely liquids, the output of a world-scale ethylene facility could be served by an 8-inch pipeline to tidewater at Haines, Valdez, Whittier or Cook Inlet, and a broad-range olefins facility would require a 10-inch pipeline. If all the State's royalty gas were converted to methanol, the methanol alone would require a 12-inch pipeline; a 14-inch pipeline would be required to carry 55,000 barrels per day of methanol, together with the products of a world-scale olefins plant. The maximum scale products pipeline that can be envisioned is one which would carry methanol, olefins products plus all of the natural gas liquids produced with the Prudhoe Bay gas and not utilized in the field, for pumping or in chemical manufacturing; a 20-24-inch pipeline would be required for this purpose.

The alternative mode of transportation is the use of rail cars on the Alaska Railroad to Whittier or Seward. A world-scale ethylene plant (300,000-500,000 tons per year) would need 30-60 100-car unit trains per year, depending upon the product mix. An ethylene-propylene-butylene complex might require as many as 90 such trains. The methanol produced from all the State's royalty gas would require as many as one additional unit train per day. According to the Alaska Railroad, such additional volumes are all within the present capacity of the railroad to move without major capital improvements.

BASIC CONCEPTS - Petrochemicals from Methane.

The principal product from a petrochemical facility using methane from the NWA pipeline would be methanol. Other elementary methane derivatives which might be manufactured in such a facility are ammonia, acetylene, formaldehyde, urea and acrylonitrile. The volumes of any of these products that would be produced from processing the State's entire royalty gas stream (200 million cubic feet per day) would be very large in relation to existing North American consumption. The only methane product likely to be marketable in such quantities is fuel-grade methanol, the demand for which would be nearly unlimited at a price competitive with other clean-burning fuels in markets such as Southern California. Methanol could conceivably be used as boiler fuel or turbine fuel for electric power generation, or blended with motor gasoline or diesel oil in proportions up to 10 or 20 percent. Each million-cubic-feet-per-day facility would produce about 330,000 tons of methanol per year (5.5 mb/d). The State's royalty gas from Prudhoe Bay could conceivably support as many as ten such trains.

BASIC CONCEPTS - Petrochemicals from Ethane.

Ethane could be made available in Interior Alaska either from a gas processing plant extracting it from its mixture with methane in the NWA gas pipeline, or from a gas processing plant at Prudhoe Bay which would send the ethane, together with propane and butanes, through a gas liquids pipeline to or beyond Fairbanks. The principal use of ethane would be for manufacture of ethylene, which is the principal raw material for manufacture of polyethylene (high density and low density), ethyl alcohol and acetaldehyde, styrene (requires benzene), ethylene glycol and ethanolamine.

Any ethylene facility built in Interior Alaska would be of "world-scale," that is, of the most economical size assuming access to national and world markets. Such a plant would consume 13-21 mb/d of ethane and produce 300,000-500,000 tons per year of ethylene. Ethylene itself could be shipped by products pipeline or tank cars to tidewater for further processing elsewhere, or converted in the same plant to some of all of the products mentioned previously.

BASIC CONCEPTS - Petrochemicals from Propane and Butane.

Propane and butane extracted from the natural gas at a Prudhoe Bay processing plant might be transported to or beyond Fairbanks in a gas liquids pipeline, together with or apart from some or all of the ethane. The volumes of butane and propane corresponding to 2.0 bcf/d of pipeline gas (methane + ethane) are about 70mb/d and 10 mb/d respectively. A single world-scale propylene plant would utilize about 15mb/d of propane to produce about 130 million tons of propylene per year. Propylene might be further processed to isopropyl alcohol, acetone, cumene and

polypropylene. Additional processing in Interior Alaska would be unlikely in the foreseeable future.

Butane can be cracked to butylene and further processed to n and t-butanol, methyl ethyl ketone, butadiene, butyl rubber, di- and tri-isobutane and polyisobutane. The size of a butane plant would be limited by feedstock availability rather than technology.

BASIC CONCEPTS - Further Processing.

Because of the severe capital and operating costs handicaps of operating in Interior Alaska compared to Lower 48 sites, the Far East or even tidewater locations in Alaska, it is unlikely that further processing beyond the products mentioned here to finished chemicals (pharmaceuticals, resins, paints, etc.) or plastic products would take place in Alaska. Comparatively high shipping costs for non-hydrocarbon raw materials would also make it unlikely that compounds involving halogens or sulphur would be produced locally.

The petrochemicals likely to be produced in an Interior Alaska plant would all tend to be liquids with relatively low vapor pressures or solids at ambient temperatures, relatively non-corrosive and without exceptional safety problems in handling.

Technical Descriptions

Technical descriptions of the types of petrochemical plants that conceivably could be located in the Fairbanks area were developed by three experts: Dr. Louis York, chief environmental scientist for Stearns-Roger, Dr. Arlon Tussing, professor of economics with ISER and Dr. Gordon Harrison, an economic consultant. Dr. York has had over 30 years experience in the fields of petroleum production, transportation, refining and in the assessment of the environmental effects of petroleum-related activities. He currently heads the environmental assessmental division of the world's largest petroleum engineering and construction firm. Dr. Tussing has been extensively involved in the economic analysis of energy developments and policies within Alaska. He has served as chief economist of the Senate's National Fuels and Energy Policy Study in 1974 and as a member of the Alaska Royalty Oil and Gas Development Advisory Board. Dr. Harrison has served as an economic consultant with the firm of Dames and Moore, developing projections of construction schedules and manpower requirements for such projects as the Atlantic Richfield Trans-Mountain pipeline project and for the Bureau of Land Management-Outer Continental Shelf Studies Program concerning offshore energy developments.

Initial project plans called for Dr. York, with the aid of engineers at Stearns-Roger, to develop estimates of the construction costs, direct employment and physical characteristics of one or more petrochemical

facilities within a general range of facilities that was previously identified to be both technically feasible and economically conveivable. Dr. Harrison's project responsibility was to develop estimates of construction costs and manpower requirements for a gas liquids and a products pipeline. Estimates from both Dr. York and Dr. Harrison would be integrated by Dr. Tussing as a complete technical description to which he would add estimates of relevant indirect effects.

For reasons beyond his control, Dr. York was unable to provide Dr. Tussing with technical estimates on schedule. In order to maintain the extremely tight project schedule, Dr. Tussing proceeded to independently develop his own technical estimates. Thus, two sets of estimates were independently derived from this project. While the estimates are not entirely comparable, they are, in fact, quite similar. Dr. York assumes that all royalty gas will be removed at Fairbanks and processed through a separation plant to separate the methane from the ethane and a small amount of propane. The methane is assumed to be processed completely to methanol. The ethane and propane is assumed to be delivered to an ethylene plant, which then produces large amounts of ethylene and various quantities of other materials shown in Figure 2-1. The ethylene could be sold directly or could be converted to other products. York assumed two alternatives: conversion of all ethylene to polyethylene pellets or conversion of all ethylene to ethanol. The methanol and ethanol could be shipped as liquids in tank cars or by pipeline. The ethylene could be shipped as pressurized gas in cylinders or by pipeline. The polyethylene pellets are solid and could be shipped in closed hopper cars. A summary of the capital costs, process facilities, construction labor force requirements, operating costs and permanent labor force requirements under Dr. York's assumptions is given in Table 2-1.

Dr. Tussing developed four scenarios which range from the smallest to the largest technically feasible and economically conceivable facilities. In the first scenario, Dr. Tussing assumes that an ethylene plant would be constructed. Such a plant would be the simplest, lowest-cost world-scale petrochemical facility using North Slope feedstocks which is both technically feasible and economically plausible for Interior Alaska. Thirteen to twenty-one thousand barrels per day of ethane would be extracted from the gas stream (methane + ethane) in the Northwest Alaskan pipeline, and converted to 300-500 thousand tons per year of ethylene, which would be shipped to tidewater in special rail cars on the Alaska Railroad. No major roadbed or track improvements would be necessary to carry these volumes, but some additional railroad investment would be necessary for a spur track and terminal at the plant.

In the second scenario the State's entire royalty gas share (250 mmcf/d of methane and ethane) is used as feedstock for one 300-500 thousand ton per year ethylene plant as in the first scenario, or as feedstock to 10 facilities producing about 5.5 thousand barrels per day of fuel-grade methanol. Both products would be transported to tidewater by means of a 12-inch products pipeline.

FIGURE 2-1

NOTES

1. FLOWS ARE GIVEN IN MM LB/YEAR
2. DOLLAR VALUE OF PRODUCTS IS GIVEN IN MM $/ YEAR -- SHOWN IN ( ).

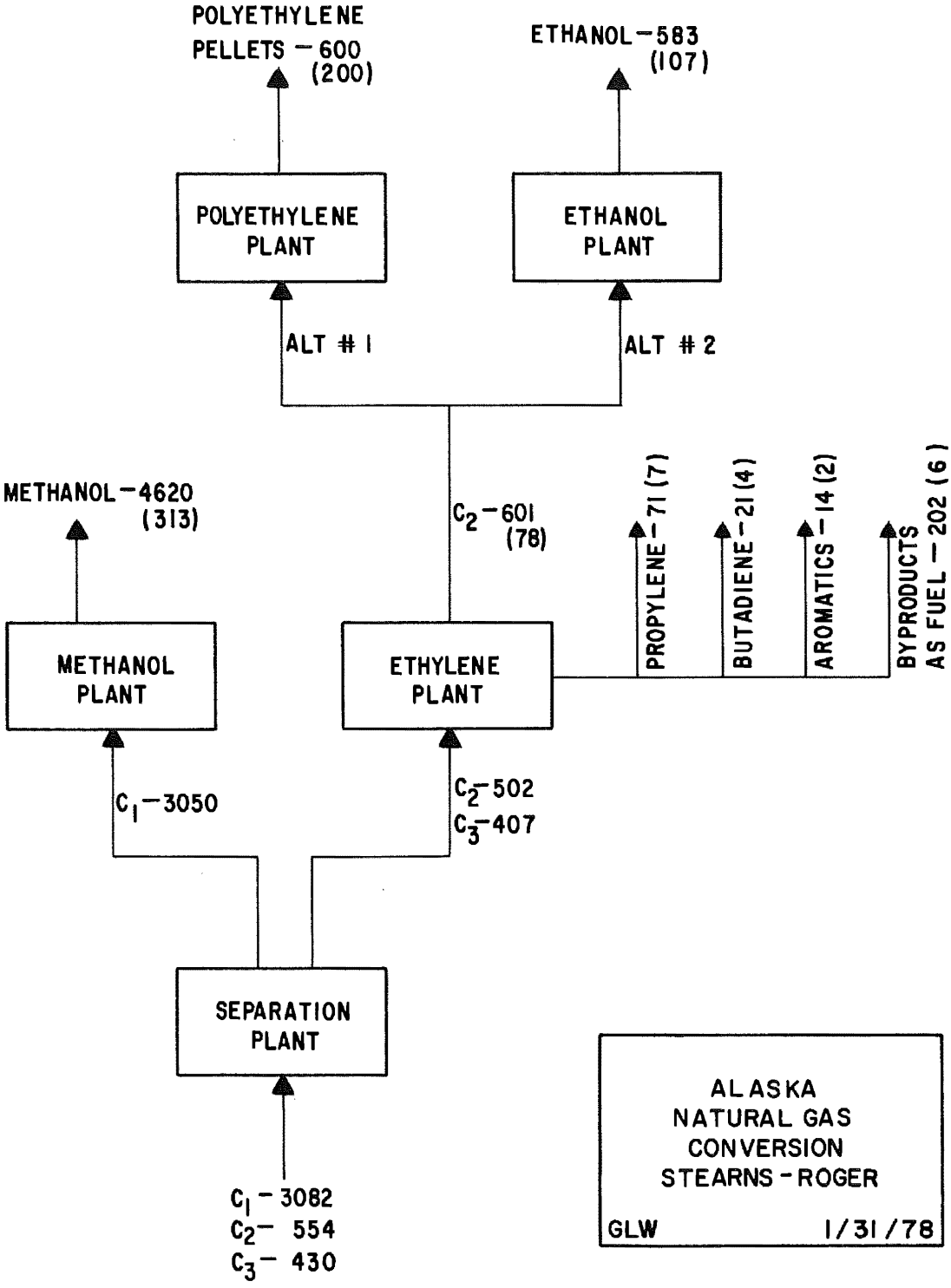


TABLE 2-1

Alaska Natural Gas Conversion

Stearns-Roger
C-20763

	Separation Plant	Methanol Plant	Ethylene Plant	Polyethylene Plant	Ethanol Plant
Capital Expenditure, MM$	67	399	271	218	90
Typical Process	Expander	ICI Low Pressure	Lummus	Tubular LDPE	Veba-Chemie AG
Peak Construction Force	400	2,000	1,450	1,200	400
Operating Costs, MM$/Yr	4	57	24	10	4
Permanent Employees (excluding 50 overall plant support positions)	120	160	145	165	130
Operating Lines	1	3	1	2	1

NOTES

1. Plant cost based on 1978 dollars. Costs must be escalated to projected completion date. Costs assumed 200% of Lower 48.
2. Plant location assumed to be near the Fairbanks area. No camp facilities or special offsites included.
3. Construction force given as 120% of Gulf Coast requirements.
4. Operating costs include labor, maintenance, and utilities only.
5. All estimates are order of magnitude only.
6. Engineering design time: 18 mos.
   Construction time: 40 mos.
   Average const. force for first three plants: 2,160

The third scenario assumes that ethane, propane and butanes extracted from Prudhoe Bay natural gas on the North Slope are carried by an 8-inch gas liquids pipeline to the Fairbanks area, where they are used as feedstock for a world-scale olefins (ethylene, propylene and butylenes) steam-cracking facility. These olefins are further processed in the same complex into low- and high density polyethylene, ethyl alcohol, ethylene glycol, and (together with benzene purchased from the North Pole refinery) styrene monomer; acetone, propylene glycol, cumene, isopropyl alcohol and polypropylene; butanols, methyl ethyl ketone, butadiene, and isobutylenes). All these products (500-750 thousand tons per year) would be shipped to tidewater on the Alaska Railroad.

Finally, the fourth scenario describes the most extensive petrochemical development based upon Prudhoe Bay natural gas feedstocks which is technically feasible and economically plausible for Interior Alaska. It would use the State's entire royalty share of methane carried through the Northwest Alaskan gas pipeline, together with the entire stream of natural gas liquids produced from the gas processing plant on the North Slope, less the gas and liquids used as fuel in the field and as pump station fuel for the oil, gas and liquids pipeline. The liquids would be transported as far as Fairbanks in an 18-inch gas liquids pipeline. There would be a world-scale olefins complex as in scenario III, ten methanol trains as in scenario II, plus a 450,000 ton ammonia plant, a 500,000 ton urea plant, a 200,000 ton (37%) formaldehyde plant, and 50,000 ton ethanolamine and acrylonitrile facilities. Solids and liquids raising contamination problems would be transported by rail, while the remainder of the liquid products, plus the unutilized gas liquids, would be transported to tidewater in an 18-inch products pipeline.

Table 2-2 provides a summary of capital costs, construction estimates and permanent employment for the four scenarios developed by Dr. Tussing. A breakdown is also given by specific facility to permit a rough comparison to be made between Dr. York's and Dr. Tussing's estimates. The best comparison can be made between the first three columns of each table, thus including a separator, an ethylene and a methanol plant. The relevant figures are repeated in the first two columns of Table 2-3. Although derived independently, the estimates for required capital expenditures and permanent employment are not significantly different. Construction estimates do vary widely. Peak estimates will vary according to the timing of construction for each component of the plant, and Dr. York assumed all three plants would be built simultaneously while Dr. Tussing assumed that construction of the plants would be phased. It does appear, however, that a substantial difference between the estimates would remain even if common assumptions were made about the timing of the construction.

The scenario developed by Dr. York roughly corresponds to Dr. Tussing's second scenario. Dr. Tussing's third and fourth scenarios are considerably larger and more complex facilities. While Dr. Tussing has included them in the range of technically feasible and economically conceivable petrochemical developments, he cautions that it is extremely unlikely

TABLE 2-2

Alaska Natural Gas Conversion
Dr. Arlon Tussing

	Capital Expenditure MM$	Peak Construction Force	Construction Duration (months)	Total Man-months Construction	Average Monthly Construction Employment	Permanent Employees
Separation Plant	71	710	18	8,520	473	65
Ethylene Plant	284	710	18	8,520	473	160
Methanol Plant	381	736	30	6,200	207	200
Ethylene, Propylene, Butylene Complex	1,641	2,317	18	30,250	1,681	1,040
Methane Prod. Olefins Com. Ethanol, Amine, Acrylonitrile Facility	2,164	1,880	30	19,060	1,744	1,335
12-inch Product Pipeline	132	389	12	2,400	200	10
8-Inch Gas Liquids Pipeline	120	1,778	12	11,784	982	25
18-Inch Gas Liquids Pipeline	146	2,108	12	14,280	1,190	30
18-Inch Product Pipeline	146	330	12	2,640	220	12
RR Spur & Terminal	-	240	12	1,440	120	10
Scenario I	355	830	18	9,960	553	250
Scenario II	868	856	30	17,120	571	435
Scenario III	1,952	2,517	30	50,344	1,678	1,160
Scenario IV	2,908	3,462	30	69,240	2,308	1,642

TABLE 2-3

Comparison and Synthesis of Petrochemical Scenarios

	Dr. Tussing's Estimates	Dr. York's Estimates	Addition of Ethanol Plant	Final Estimates for Petrochemical Complex
Capital Expenditure (millions)	736	737	90	830
Peak Construct. Work Force	1,450	3,850	400	3,000
Ave. Construct. Work Force	680	2,160	216	1,500
Permanent Work Force	425	475	130	600

that economic conditions in the foreseeable future would be such as to justify processing North Slope natural gas beyond the most elementary products. Dr. Tussing suggested that it would be more realistic to rely only on scenarios I and II. A single question referring to the possibility of a much larger facility was, however, included in the survey.

To summarize the major scenarios developed by both Dr. Tussing and Dr. York, both assume that the methane and ethane from the Northwest gas pipeline will be separated and processed into methanol and ethylene. Furthermore, the permanent employment and capital cost estimates derived for each scenario are amazingly close. As a result, the integration of the two scenarios is relatively easy. Dr. York's scenario contains two alternative end products in the conversion of ethylene: ethanol or polyethylene. Both facilities are potential additions to Dr. Tussing's second scenario. It was felt that the best way to integrate scenarios was to add either the ethanol or the polyethylene processing facility to Dr. Tussing's second scenario. Ethanol was chosen as a product for the final scenario since the ethanol facility would be smaller than the polyethylene facility and the development of a smaller plant was considered more likely. The relevant figures for the ethanol plant appear as a third column in Table 2-3. Capital cost estimates for the basic facility agree closely, so there is little question about the assignment of a single best estimate for the complex as a whole (see Table 2-3). The same is true for the permanent workforce estimates. More judgment was involved in estimating average and peak construction employment. The final construction estimates, which appear in column four of Table 2-3, roughly correspond to the midpoint between the two estimates. Finally, it should be noted that Dr. Tussing's second scenario included a 12-inch products pipeline. To make the scenario easier to present to the public and since employment and capital costs for the products pipeline are minor compared to the petrochemical plant itself, cost and employment estimates were made only for the plant. The scenario did mention, however, that the petrochemicals would be transported by pipeline or rail.

The final scenario also mentions that few, if any, products would be available locally. This judgment is based on the fact that the local or even statewide market for petrochemical products is too small to warrant extensive processing of intermediate products for local distribution. Many such products would require the importation of chemicals to the Interior, thus adding substantial production costs. Final products that were available would be most profitably sold at just below current market prices. There was a strong concensus among the project staff that local products should not be listed among the likely benefits of a petrochemical facility located in the Fairbanks area.

The chemical processes involved in the final scenario clearly do not involve the pollutants that are associated with the oil-based petrochemical industry or with processes that require the addition of aromatic compounds or chemicals such as chlorine. The potential effect of water vapor emissions is more problematic. Providing stack emissions do not occur within

about the first six hundred feet above the urban basin, it does not appear that a petrochemical plant would directly contribute to the ice fog which occurs at or near ground level. This judgment is based not only on a knowledge of the characteristics of petrochemical plant stack emissions but also on experience with similar emissions in the Fairbanks area.

The final area addressed in the petrochemical scenario is that of induced changes in employment and population. Traditionally applied employment multipliers are not appropriate for Fairbanks because much of the support sector employment increase generated by basic industry occurs in Anchorage. We assumed that the addition of five jobs in basic industry will result in one additional job in the support sector in the Fairbanks area. The projected population increase is based on the assumptions that two-thirds of the permanent jobs created will be filled by non-residents possessing the necessary skills and that the average family size of those moving to Fairbanks is 2.5. The exact number of indirect jobs created and the resultant population increase is, of course, impossible to predict. Under varying assumptions it is possible that both figures might be doubled. The important point is that the population will not increase by more than several percent nor will the number of permanent indirect jobs created be in any way comparable to that experienced during construction phase of the trans-Alaska pipeline.

Interviewers read the complete scenario to each respondent during the course of the interview. Respondents were also given a copy of the scenario and two diagrams (see Figures 2-2 and 2-3) to aid in remembering the points covered in the description. Following the presentation of the scenario, respondents were asked if they were confused about any statements or if they wished to hear parts of the scenario again. Interviewers were instructed to note which paragraphs were reread and to record any comments the respondent might make about the scenario. They were expressly forbidden to attempt to answer questions or respond to comments in any way other than to repeat information contained in the written scenario. Furthermore, interviewers were trained to read the scenario exactly as it was written. In this way, the information presented to each person interviewed was exactly the same. A copy of the information packet given to each respondent when the scenario was presented concludes this chapter.

FAIRBANKS PETROCHEMICAL STUDY

Interview Packet

SECTION B

PETROCHEMICAL DEVELOPMENT DESCRIPTION

1 We have found that not everyone expects petrochemical development to cause the same changes in the Fairbanks area. Some people believe the petrochemical plant would be very small and others feel it would be very large, for example. For this reason, it would be unfair of us to ask everyone simply if they favor petrochemical development. One person may favor petrochemical development because he thinks it will create many jobs and little air pollution. Another person may oppose petrochemical development because he thinks it will only employ outsiders and will result in poor air quality. Many more people may have no opinion because they don't know what to expect.

2 As a part of this study, we have asked several experts in the field of energy development to give us a description of the general type of petrochemical industry which could possibly locate in the Fairbanks area. The description includes how many people might be employed, what kinds of pollution might be produced and how much taxable property might be added in the Borough. I would like to take a few minutes to read the short description to you before proceeding with this interview.

3 As you know, the Prudhoe Bay field consists not only of the crude oil that is being transported in the trans-Alaska oil pipeline but also natural gas. Current plans call for all or a portion of the natural gas to be transported by pipeline down the oil pipeline corridor to Fairbanks and then along the Alaska highway through Canada to the lower 48 states.

GAS PIPELINE

4 The State of Alaska owns a portion of the natural gas that is to be transported; it is referred to as State royalty gas. The State or even one of the private companies owning the gas may choose to sell some of the gas inside Alaska. Gas sold in Alaska might be used directly as fuel for homes and industry; most likely, however, it would be sold to a company which would make new products out of the gas. A petrochemical plant is basically a plant which uses natural gas or crude oil to make all sorts of new chemical products.

PETRO-CHEMICAL PLANT

In the case of Fairbanks, the type of petrochemical plant we are talking about would use only natural gas, not the crude oil.

5 A petrochemical plant is expensive to build anywhere, but in Fairbanks it would cost between 50 and 100 percent more to build. The transportation costs of shipping the

ECONOMIC FACTORS

products from Fairbanks to world markets would also be very high. The high construction and transportation costs for a Fairbanks plant make it uncertain if the plant could deliver its products to world markets at a price that is the same or lower than that of plants located elsewhere. In other words, it may not make economic sense to build a petrochemical plant in the Fairbanks area. On the other hand, if a plant were built in Alaska, Fairbanks would be one logical location.

6 For what we are talking about today, we don't have to worry about whether a petrochemical plant can be built in Fairbanks. We want to know what your opinions are about a petrochemical plant <u>if</u> it is built in the Fairbanks area.

7 How do the experts think a petrochemical plant would change Fairbanks anyway? Well, naturally, the experts don't all agree and there are many possible types of plants they can choose from. However, we did get several of them to agree on what they believe is the general type of plant that could be built in Fairbanks.

8 Here is a diagram which shows you what's involved. Leaving Prudhoe are two lines, oil and gas. Both lines pass

METHANE

through the Fairbanks North Star Borough. Inside the Borough, State royalty gas is taken from the gas pipeline and separated into methane, the lightest gas, and a mixture of ethane and propane. From the separator plant, the methane is used primarily to make methanol which can be used as a fuel. The methanol and other methane-based products are shipped out of Fairbanks in a third pipeline and/or in special cars on the Alaska railroad. Just to give you an idea of scale, the methanol produced would more than double the supply in the United States.

9 The separated ethane, and a little propane, is converted

ETHANE

primarily to ethylene which in turn is used to make ethanol, or polyethylene pellets and a mixture of other products. Neither the ethane or the ethane would be used to produce any finished chemical products such as paints, pantyhose

PRODUCTS

or pharmaceuticals. While some products like ethylene glycol, the basic ingredient in anti-freeze, would be produced, our experts tell us that there is not much chance of their being marketed locally; and if they were, the price

would not differ greatly from what you pay now. The entire plant and surrounding lands might occupy one square mile.

10 Now on to what the petrochemical plant would mean to you, a Fairbanks resident. The plant would take about three years to construct, using an average of some 1,500 workers with a peak employment of perhaps twice that. Put another way, the local construction employment would be roughly two-thirds of the local employment during the construction of the oil pipeline. The first year of construction would probably involve local contractors and labor. Later stages of construction would require special skills not common in Fairbanks.

CONSTRUCTION

11 I mentioned earlier that the plant would be expensive to build. That means that if it is built the plant will add a great deal to the total amount of taxable property in the North Star Borough. Im fact, the plant would be worth between about 810 and 860 million dollars. That would represent about 40 percent of the value of all the property (including your home and everyone else's) in the Borough. If the plant paid property taxes at the current tax rate, it would pay 4 million a year to the Borough and increase total Borough revenues by about 15 percent.

TAXABLE PROPERTY

12 To recap our description so far, the plant would process the State royalty gas and ship the products by pipeline to Haines or the Cook Inlet. Few, if any, products would be available locally. The construction of the plant would require about two-thirds the number of workers locally as required by the construction of the oil pipeline. The plant itself would increase the amount of taxable Borough property by 40 percent.

RECAP

13 Besides local products, construction jobs, and tax revenues, we need to know something about permament jobs created by the petrochemical plant. About 600 persons would work at the plant. Fifty of these jobs would be related to the overall management of the plant. The remaining 550 would be divided into shifts because the plant would have to operate 24 hours a day, year round. The plant jobs would either be filled by new residents or by existing Fairbanks residents who learn the necessary skills.

PERMANENT JOBS

14 The plant would also indirectly result in roughly 100 new jobs ranging from sales clerks to hairdressers, depending on what new demands are placed on the community. All in all, the new jobs at the plant and in the community might bring 1,200 people to Fairbanks. The 1,200 represents about a 2 percent increase in population and would add their share of cars, housing, and ice fog and spend their share of dollars in the community.

INDIRECT JOBS

POPULATION

15 The last part of our description concerns the effect of the plant on our air and water. The plant will use water, but probably they would use air rather than water

ENVIRONMENT where they need to cool a chemical process. As a result the plant would not use tremendous amounts of water or release hot water into nearby rivers. Gas-based petrochemical plants like the one we're talking about do not give off smelly or toxic fumes that oil-based petrochemical plants do. Gas-based plants do produce water vapor which could become ice fog in the winter. The water vapor problem and other factors make it desirable to locate the plant on higher ground, 600 feet or more above the urban area. The water vapor would then be released above the layer of air we breathe and drive around in. Since the higher layers of air do not mix with the lower layers on cold days, any ice fog produced by the plant would not be added to the ice fog layer in the urban area.

FIGURE 2-2

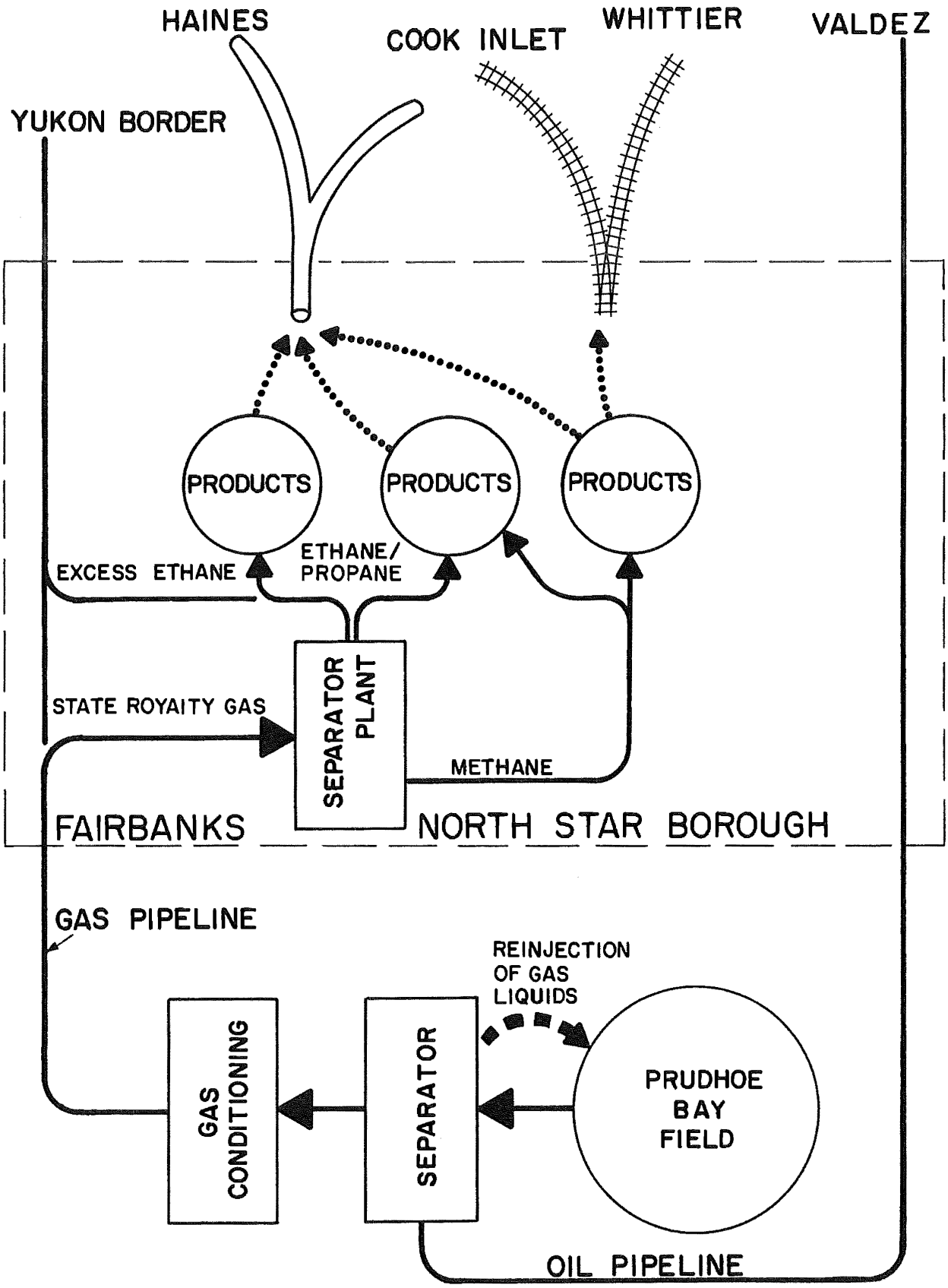
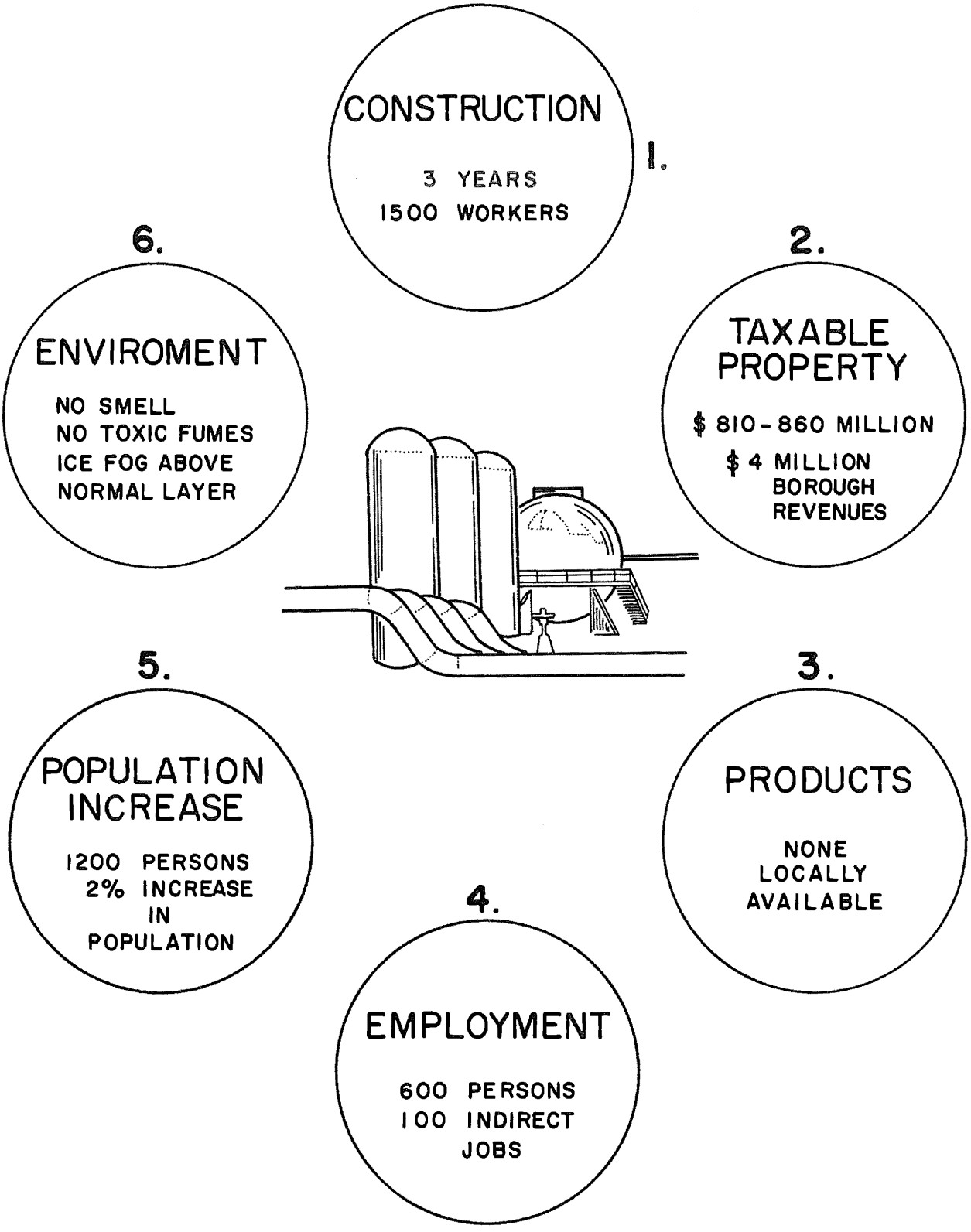

HAINES
COOK INLET
WHITTIER
VALDEZ
YUKON BORDER
PRODUCTS
PRODUCTS
PRODUCTS
EXCESS ETHANE
ETHANE/
PROPANE
STATE ROYAITY GAS
SEPARATOR PLANT
METHANE
FAIRBANKS
NORTH STAR BOROUGH
GAS PIPELINE
REINJECTION
OF GAS
LIQUIDS
GAS
CONDITIONING
SEPARATOR
PRUDHOE
BAY
FIELD
OIL PIPELINE

FIGURE 2-3

EFFECTS OF PETROCHEMICAL DEVELOPMENT



Chapter Three

GENERAL ATTITUDES AND EXPECTATIONS ABOUT GROWTH IN THE FAIRBANKS AREA

We noted in the introduction to this report that attitudes toward petrochemical development must be viewed in the context of general attitudes and expectations about growth in the Fairbanks area. To establish that context, our sample of Fairbanks residents was asked to tell us how they expect the community to change over the next ten years. Growth, of course, involves much more than an increase in community size; it also means more jobs, more land developed for housing, more air pollution, more stores, as well as changes in many other community attributes. Respondents were asked to voice their personal expectations about fourteen major community attributes using pre-set categories ranging from "stay about the same" to "increase very rapidly." Although some community attributes (air quality, for example) are usually thought of as being likely to decrease rather than to increase, each item was deliberately worded so that the attribute would either be expected to stay the same or increase. Thus, the item "air quality" was reworded "amount of air pollution." In this way, we can compare rates of change across the entire range of community attributes. A summary of public expectations is presented in Table 3-1.

The results given in Table 3-1 reflect what Fairbanks residents expect to happen over the next ten years, not necessarily what they would like to see happen. The most rapid change expected is in the availability of nearby opportunities for hunting and fishing. Over half of the Fairbanks population expect that the distance they will have to travel to find good hunting and fishing will increase rapidly over the next ten years.[2] Less rapid increases are expected for the amount of taxable property in the Borough and the amount of air pollution, with most respondents indicating that they expect to see a slow increase in these categories. At the opposite extreme, almost half of the survey respondents expect the number of personal job opportunities to remain about the same as they are now. Little or no growth is expected in the number of locally made products available and the number of jobs related to agriculture. Expectations regarding the remaining items listed in Table 3-1 are for slow to moderate growth. A comparison in growth rates can best be made in Figure 3-1 which indicates the average rate of increase expected for each of the fourteen community attributes. The major

[2]When respondents who were assuming that a petrochemical plant would be built are included, the comparable figure is exactly the same to that for the 202 respondents who were not assuming that a petrochemical plant would be built when they gave their general growth expectations.

TABLE 3-1

Public Expectations for Growth in Fairbanks
(percent distributions)

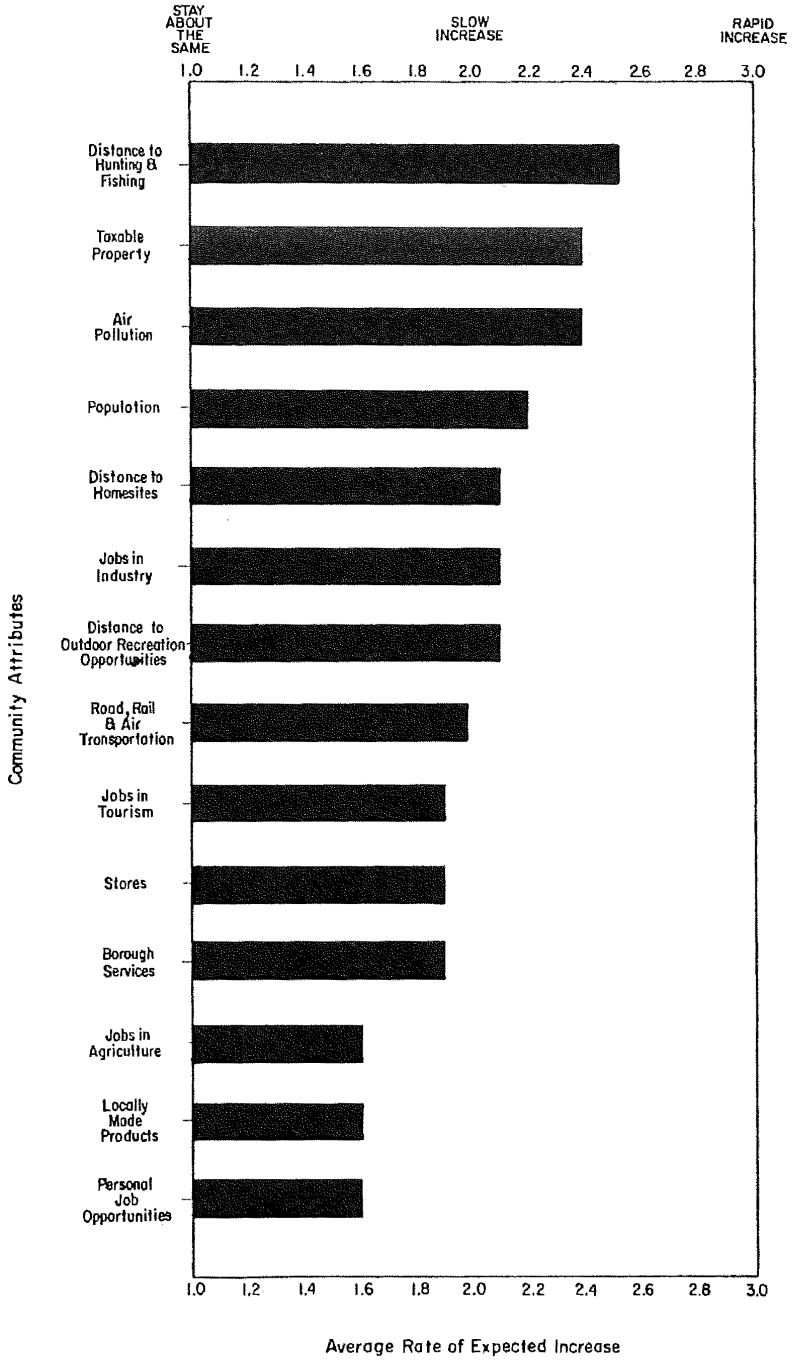
	Stay about the same	Increase slowly	Increase rapidly	Increase very rapidly	
distance you have to go to find good HUNTING & FISHING	25	22	35	18	= 100
amount of PROPERTY taxed by the Borough	10	52	29	9	= 100
amount of ice fog and other forms of AIR POLLUTION	16	43	28	13	= 100
number of PEOPLE living in Fairbanks	8	63	27	2	= 100
distance you have to go to find a good location for HOUSING	22	50	24	4	= 100
number of jobs related to INDUSTRY	16	62	22	-	= 100
distance you have to go to find OUTDOOR RECREATION opportunities	36	31	25	8	= 100
quality of ROAD, RAIL, and AIR connections to Fairbanks	26	52	19	3	= 100
number of jobs related to TOURISM	32	49	17	2	= 100
number of STORES and shopping centers	27	59	13	1	= 100
amount of SERVICES provided by the Borough	29	54	15	2	= 100
number of jobs related to AGRICULTURE	40	47	12	1	= 100
number of locally made PRODUCTS available	36	55	8	1	= 100
number of JOB OPPORTUNITIES FOR YOU	46	39	12	3	= 100

Number of Respondents: 202[1]

[1]While the entire sample consists of 436 respondents, the results reported here only include those respondents who were not assuming that a petrochemical plant would be built in the Fairbanks area. Note that this question was asked before any reference was made to petrochemical development in the interview itself.

FIGURE 3-1

AVERAGE EXPECTATIONS FOR CHANGE IN FAIRBANKS OVER THE NEXT TEN YEARS



[1]Bars indicate the average (mean) response for each item on a 4-point scale, where "1" is stay about the same, "2" is increase slowly, "3" is increase rapidly, and "4" is increase very rapidly. The results reported here include only those respondents who were not assuming that a petrochemical plant would be built in the Fairbanks area.

conclusion that can be drawn from Figure 3-1 is that Fairbanks residents generally do not expect to see rapid changes over a broad range of community attributes in the next ten years. On the other hand, most people in Fairbanks do expect to see at least a slow increase in all community attributes.

Our next task is to assess how Fairbanks residents feel about the changes they expect to see. Which changes do they want to see and which would they like to avoid? To obtain an answer to this broad question, survey respondents were asked a series of four questions. The first was, "Of the changes you expect, which ones will make Fairbanks a better place for you to live?" Respondents reviewed the list of fourteen items and indicated all appropriate community attributes. The second question went further, asking, "Which of the items would you like to see change more rapidly?" Of course, a respondent could mention the same item in response to both the first and the second questions. The third question addressing attitudes toward expected change was, "Which of the changes you expect are not good in themselves but are necessary to insure that overall Fairbanks is a good place for you to live? That is, they are necessary evils." This question avoids the simple dichotomy of positive or negative attitudes and encourages the respondent to think for a moment about the tradeoffs associated with creating new jobs, better services, and so forth. No one would disagree that pollution is undesirable but some are willing to tolerate additional pollution if the result is more jobs while others feel that costs outweigh the benefits. The final question establishes which community changes are viewed as being particularly undesirable: "Which, if any, of the changes you expect are changes that you would especially not like to see?"

Responses to all four questions were integrated to construct an overall attitude toward each community attribute. The response distributions for each overall attitude are presented in Table 3-2. As the results in Table 3-2 indicate, some community changes are clearly desired and others are plainly unacceptable. More rapid change in road, rail and air transportation, locally made products, personal job opportunities, and jobs related to agriculture are desired by a third or more of Fairbanks residents. Most of the remaining population is at least content with expected increases and few object strenuously to any increases in these attributes. On the other hand, it should be noted that Fairbanks residents do not expect these community attributes to rapidly increase (see Table 3-1 and Figure 3-1). Their attitudes could be different if rapid increases were expected.

Increases beyond those expected for industrial jobs and Borough services are also desired by almost a third of the population but a minority of Fairbanks residents (11 percent) feel that increases in these areas are especially undesirable. Further erosion in public support can be observed for increasing the number of stores and shopping centers or for increasing the number of jobs related to tourism (see Table 3-2). Increases in the distance one must go to find good housing appears to be

TABLE 3-2

Attitudes Toward Expected Changes in Fairbanks
(percent distributions)

	Desire More Rapid Increase	Content with Expected Level	Not Like but Tolerate Increase	Especially Undesirable	
quality of ROAD, RAIL, and AIR connections to Fairbanks	40	50	7	3	= 100
number of locally made PRODUCTS available	39	56	4	1	= 100
number of JOB OPPORTUNITIES FOR YOU	38	58	2	2	= 100
number of jobs related to AGRICULTURE	34	61	4	1	= 100
number of jobs related to INDUSTRY	31	48	10	11	= 100
amount of SERVICES provided by the Borough	30	51	8	11	= 100
number of STORES and shopping centers	13	64	11	12	= 100
number of jobs related to TOURISM	12	67	12	9	= 100
distance you have to go to find a good location for HOUSING	5	54	12	29	= 100
amount of PROPERTY taxed by the Borough	5	46	18	31	= 100
distance you have to go to find OUTDOOR RECREATION opportunities	5	52	8	35	= 100
distance you have to go to find good HUNTING & FISHING	5	47	6	42	= 100
number of PEOPLE living in Fairbanks	3	38	21	38	= 100
amount of ice fog and other forms of AIR POLLUTION	3	23	11	63	= 100

Average Number of Respondents: 405[1]

[1]Respondents who gave an inconsistent response such as desiring a more rapid increase in industry jobs and mentioning an increase in industry jobs as being especially undesirable were not included in the above results.

unacceptable to almost a third of the Fairbanks population, while 12 percent will tolerate the expected increase and over half are content with the expected moderate increase. It should be noted that 71 percent of the approximately 6,700 Fairbanks households who plan to purchase a home in the Fairbanks area sometime in the future prefer to locate in a rural subdivision or isolated rural area.[3] Already over 40 percent of the households in the North Star Borough are located outside the urban area. The trend toward dispersed housing coupled with the apparent willingness of many to travel further to find a good homesite may result in a more rapid development of land outside the urban area than most Fairbanksans expect.

Interestingly, increases in the amount of taxable property do not appear to be desired by many Fairbanks residents. Despite the best efforts of our interviewers, one suspects that a substantial proportion of our survey respondents could not avoid equating an increase in the amount of taxable property with the amount of taxes they will pay in the future. It is possible that the community resources required to service additional taxable property may indeed be greater than the tax revenues generated by the new property, thus increasing the tax burden on existing property. While this outcome is not uncommon in communities which primarily serve as bedrooms to nearly urban centers, a net increase in taxes as a result of increased taxable property in Fairbanks is much less of a certainty and generally would not be expected to result from the addition of pipelines, pump stations or capital intensive basic industries. In any case, it is unlikely that the general public would assume that more property to tax will raise taxes. Therefore, the negative attitudes expressed toward increases in the amount of taxable property may be more properly interpreted as negative attitudes toward tax increases.

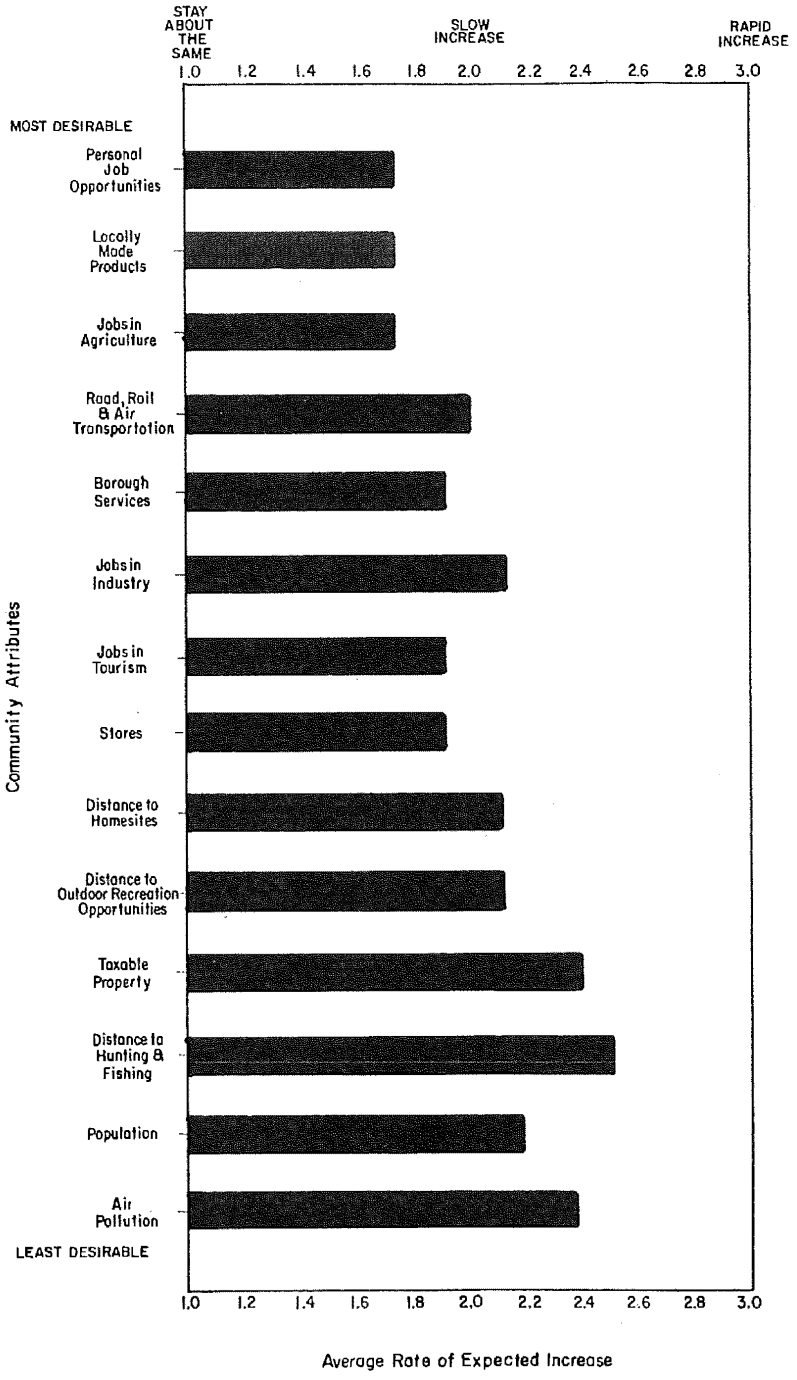
The interpretation of the negative attitudes expressed toward the expectations that good outdoor recreation and hunting and fishing opportunities will become rapidly more distant from Fairbanks and that the amount of air pollution and people living in Fairbanks will increase requires no special qualification. Particularly with regard to the amount of air pollution, most Fairbanks residents simply do not like the increase they expect to see.

Now that we have some idea about what changes people expect and how each type of change is viewed, what conclusions can be drawn about the overall pattern of change; will it be mostly for the better or mostly for the worse? Figure 3-2 illustrates the same general growth expectations shown in Figure 3-1 but reordered to reflect the most desired changes at the top of the graph to the least desired changes on the bottom. The resulting pattern of expectations appears fairly pessimistic; the most rapid changes are expected for the very community attributes that are least desired: the amount of air pollution, the number

[3]The moving plans of Fairbanks residents is discussed in detail in Chapter Seven.

FIGURE 3-2

AVERAGE EXPECTATIONS FOR CHANGE IN FAIRBANKS OVER THE NEXT TEN YEARS ARRANGED ACCORDING TO ATTITUDES TOWARD CHANGE [1]



[1]Bars indicate the average (mean) response for each item on a 4-point scale, where "1" is stay about the same, "2" is increase slowly, "3" is increase rapidly, and "4" is increase very rapidly. The results reported here include only those respondents who were not assuming that a petrochemical plant would be built in the Fairbanks area.

of people and the distance to good hunting and fishing opportunities. However, when asked, "Overall, would you say that over the next ten years Fairbanks will be a better place for you to live, a worse place for you to live or will it be just as good a place to live as it is now?", only a quarter of our survey respondents indicated that they think Fairbanks will be a worse place to live (see Table 3-3). The apparent discrepancy between this overall evaluation of change and the response we would expect based on the pattern of individual expectations requires some explanation. How can Fairbanks residents be so pessimistic about so many specific areas of community change and yet express a generally optimistic view about the pattern of change as a whole? One possibility is that small positive increases may be perceived as relatively more important than larger negative increases. For example, people may pay more attention to the gradual expected increases in locally available products and less attention to the rapid expected increase in the amount of air pollution.

The survey data offers an opportunity to test the hypothesis that negative expectations do not carry as much weight in an overall evaluation as positive increases. By using the fourteen individual expectations of change discussed earlier to predict the responses to the question about the overall pattern of change reported in Table 3-3, we can determine the relative importance of each specific expectation. The results of this analysis are presented in Table 3-4. While expectations about the availability of hunting and fishing opportunities is the most important specific expectation in explaining people's overall assessment, the three other major negative expectations (taxable property, air pollution, and number of people) contribute little, if anything, further. At the same time, Borough services and local products are important predictors, even though they are not expected to increase rapidly over the next ten years.

TABLE 3-3

Expectations Regarding the Overall Pattern of Change in Fairbanks
(percent distributions)

	Next Ten Years Compared to Now
change for the better	33
remain just as good	43
change for the worse	24
	100

Number of respondents: 429

TABLE 3-4

Relative Importance of Specific Change Expectations in the Overall Evaluation of Future Change

Specific Change Expectations	Measure of Relative Importance[1]	
distance you have to go to find good HUNTING & FISHING	-.14	MOST IMPORTANT
amount of SERVICES provided by the Borough	.13	
number of locally made PRODUCTS available	.11	
distance you have to go to find a good location for HOUSING	-.12	
distance you have to go to find OUTDOOR RECREATION opportunities	-.12	
number of STORES and shopping centers	-.10	
quality of ROAD, RAIL, and AIR connections to Fairbanks	.08	
the number of JOB OPPORTUNITIES FOR YOU	.06	
number of jobs related to INDUSTRY	.06	
number of PEOPLE living in Fairbanks	.03	
amount of ice fog and other forms of AIR POLLUTION	-.03	
number of jobs related to TOURISM	.01	
number of jobs related to AGRICULTURE	.00	
amount of PROPERTY taxed by the Borough	.00	LEAST IMPORTANT
Addition of Two Reasons for Living in Fairbanks		
here for economic reasons	.19	
here to be self-reliant and to live near a wilderness environment	-.20	
Overall percent of variance explained (R^2): 15		
R^2 with Alaska lifestyle and economic motivations included: 24		

[1]Reported measures are beta weights resulting from a multiple regression analysis. A negative sign indicates that the more rapid the expected change, the less favorable the overall evaluation of future change.

The results tend to confirm the hypothesis that small amounts of economic growth are perceived to be more important than larger increases in undesirable community attributes such as the amount of air pollution and the number of people living in Fairbanks.

Another key conclusion that can be drawn from the analysis of the relationships between individual expectations and the overall evaluation of change is that Fairbanks residents do not pay much attention to any individual expectations when they think about the future in general terms. The entire set of individual expectations only explains 15 percent of the variation in response to the question about whether residents expect Fairbanks to change for the better or the worse. Our success in explaining responses is almost doubled when we include as predictors the answers to several questions about why people are living in the Fairbanks area. Those that are here primarily for economic reasons tend to believe that Fairbanks will change for the better. Those that are here primarily to live a self-reliant lifestyle and/or to be near a wilderness environment tend to believe that Fairbanks will change for the worse. As the response distributions to these questions about reasons for living in Fairbanks show (see Table 3-5), more people are currently in Fairbanks for economic reasons than are here to take advantage of the surrounding environment and alternative lifestyle opportunities.

In summary, our analysis results indicate that Fairbanks residents are more optimistic about the overall course of community change than their specific expectations would suggest. The reasons for this discrepancy are explained in part because expectations for some of the most rapid negative changes are not considered as important as several slower, but positive changes. The discrepancy is also partially explained by the fact that people expect the future to meet their own personal goals and those goals primarily involve economic growth. It is important to

TABLE 3-5

Reasons for Staying in Fairbanks
(percent distributions)

Reasons for Staying in Fairbanks	Not Important	Somewhat Important	Important	Very Important	
Long-term economic opportunity and/or short-term income gains	18	35	21	26	= 100
Self-reliant lifestyle and/or living near wilderness	32	37	17	14	= 100

Number of Respondents: 429

remember, however, that the future expectations for Fairbanks are not entirely rosy and a substantial proportion of the population is seriously concerned with the effects of growth in Fairbanks on the surrounding natural environment.

Public attitudes toward expected changes in the next ten years do not differ greatly from assessments of changes which have taken place over the last four years (see Table 3-6). At most, one can conclude that residents believe that Fairbanks has changed more rapidly in the last few years than it will in the next ten. Attitudes regarding Fairbanks' future do vary widely from those assessing the community at the peak of the pipeline construction period. Most residents felt that Fairbanks had changed for the worse between 1976 and 1973, perceiving declines in every community attribute measured (34 in all) except job opportunities.[4] At that time, residents believed that most of the declines were temporary. Their current assessments appear to confirm this belief. Nearby outdoor recreation opportunities and winderness were, however, expected to suffer permanent declines and the 1978 survey results suggest these community attributes are continuing to decline in quality.

In view of the general optimism of Fairbanks residents on the one hand and some strong environmental concerns on the other, how much growth and development would Fairbanks residents actually like to see? Again, we must remember that Fairbanksans are not equally enthusiastic about all

TABLE 3-6

Comparison of Overall Community Assessments of Change
(percent distributions)

Fairbanks Community Assessment	Next Ten Years Compared to Now	Now Compared to 1973	Peak Pipeline Construction Compared to 1973[1]
Change for the better	33	38	14
Remain just as good	43	33	30
Change for the worse	24	29	56
	100	100	100
Number of Respondents:	429	429	396

[1]Results from a survey of 415 Fairbanks residents conducted in the spring of 1976.

[4]For a complete list of these attributes, see ISER Research Notes, Fairbanks Community Survey, Jack Kruse, December, 1976.

aspects of growth. They appear to be more in favor of agricultural development than of expanding the tourist industry, for example. Overall, less than one resident in five would not like to see any more growth in the Fairbanks area (see Table 3-7). At the same time, even fewer residents would like to see a great deal of growth. Not surprisingly in view of current economic conditions, there is more support for growth and development in Fairbanks now than in 1976. The results reported in Table 3-7 also indicate that registered voters, residents of less than four years and persons who are staying in Fairbanks primarily for economic reasons are all more likely to favor growth in the Fairbanks area.

We have seen in this chapter that residents expect Fairbanks will continue to grow, but at a slower rate than that of the last several years. Residents believe that the declines in nearby hunting and fishing opportunities and air quality experienced during the pipeline are permanent and will continue on a downward trend over the next ten years. On the whole, however, many Fairbanks residents are optimistic about the source of change in Fairbanks and would like to see more growth and development in the Fairbanks area. Whether this support for growth specifically applies to the development of a petrochemical industry is the central question addressed in the next chapter.

TABLE 3-7

Growth Preferences
(percent distributions)

	Amount of Growth Desired					Number of Respondents
	A Great Deal	Some	Little	None At All		
Total Sample						
1978 Survey	18	54	18	10	= 100	433
1976 Survey	13	51	19	17	= 100	408
By Voter Status						
registered in Fbks	21	55	14	10	= 100	298
not registered in Fbks	12	51	27	10	= 100	124
By Length of Residence						
less than 4 years	21	55	16	8	= 100	125
4-10 years	16	54	23	7	= 100	146
more than 10 years	18	53	16	13	= 100	157
Importance of Economic Opportunity[1]						
not important	9	46	30	15	= 100	78
somewhat important	13	54	22	11	= 100	147
important	17	61	15	7	= 100	92
very important	30	55	9	6	= 100	115

[1]This variable was constructed from responses to two questions about possible reasons for staying in Fairbanks. These reasons were "long term economic opportunity" and "immediate income gains." Responses to each question were on a five point scale where "1" is extremely important and "5" is not at all important.

Chapter Four

PUBLIC ATTITUDES AND EXPECTATIONS REGARDING PETROCHEMICAL DEVELOPMENT

Now that the general pattern of growth expectations and preferences has been established, we can turn to the central questions concerning attitudes and expectations about petrochemical development. We are, in fact, interested in two sets of attitudes and expectations; the first set applies to the general public and is the subject of this chapter. The second set, addressed in Chapter Five, applies to Fairbanks residents who have been informed about the most likely actual effects of petrochemical development in the Fairbanks area.

Most Fairbanks residents believe that they are at least somewhat familiar with petrochemical development (69 percent). Only 7 percent have never heard of the term "petrochemical" (see Table 4-1) and over 80 percent remember reading or hearing something about petrochemical development in the media. There also appears to be a substantial amount of interest in the issue as over half the population (56 percent) has talked about petrochemical development with friends or relatives. Few, however, have attended any meeting at which petrochemical development in Fairbanks was discussed. Since so many Fairbanks residents feel that they know something about petrochemical development, how well do they agree about what it would mean for Fairbanks? In fact, Fairbanksans have widely varying notions about how big a petrochemical plant would be, what it would produce and how many people it would employ. Estimates of the worth of the plant, for example, range from less than 5 million to over 2 billion (see Table 4-2). Employment estimates vary from under 50 to over 2,000. Many of the products mentioned are not associated with gas-based petrochemical plants at all and are really only produced in oil refineries. Approximately a third to a half of our survey respondents flatly said they didn't know what the plant would be worth, how many people would be employed or what products would be locally available. Judging from the range of estimates that were offered, there are obviously no commonly shared ideas about these important characteristics of a petrochemical facility. The only direct effect for which there is even limited agreement is that some form of pollution will be produced.

The diversity of opinion about these basic characteristics and the admitted lack of knowledge on the part of so many Fairbanks residents confirms our expectation that current attitudes toward petrochemical development are based on conflicting assumptions and a fundamental dearth of relevant information. While this serves to underscore the importance of assessing attitudes and expectations observed after information about petrochemical development is presented, we still need to know how the general population views petrochemical development.

TABLE 4-1

Fairbanks with Petrochemical Development
(percent distributions)

Familiarity with Petrochemical Development[1]	Percent
Very familiar	16
Somewhat familiar	53
Just heard of it	24
Never heard of it	7
	100

Exposure to Petrochemical Development	Percent
1. Read articles about petrochemical development in Alaska newspapers or heard about it on local TV news programs	85
2. Talked about petrochemical development with friends or relatives	56
3. Lived near a place where there was a petrochemical plant	27
4. Attended meetings at which petrochemical development in Fairbanks was discussed	14

Number of respondents: 435

[1]The question read, "Now I would like to turn to one specific kind of industry which could someday be located in the Fairbanks North Star Borough. How familiar are you with the term petrochemical as it refers to a type of industry: very familiar, somewhat familiar, just heard of it, or have you never heard the term?"

TABLE 4-2

Public Estimates of Direct Effects of Petrochemical Development
(percent distributions)

A. How much do you think the plant would be worth?

	Percent
less than 5 million	25
5-10 million	19
11-50 million	18
51-100 million	6
101-200 million	3
201-500 million	8
501-999 million	2
1-1.9 billion	12
2 billion or more	7
	100

Number of Respondents: 234
Percent Don't Know: 46

B. How many people do you think would work at a petrochemical plant?

	Percent
50 or less	11
51-100	13
101-200	23
201-300	10
301-500	14
501-1000	13
1001-2000	10
over 2000	6
	100

Number of Respondents: 305
Percent Don't Know: 30

C. What products from the petrochemical plant, if any, do you think would be locally available?

	Percent
products mentioned (see below)	58
no products	11
don't know	31
	100

Types of Products	Percent
fuel, gasoline, jet or diesel fuel	39
fertilizer	12
natural gas, propane, butane	11
plastics	9
motor oil	8
chemicals, ethylene	3
general mention of products	17
other	1
	100

Number of Respondents: 434

D. What kind of pollution, if any, do you think the plant would produce?

	Percent
pollution mentioned (see below)	82
no pollution	9
don't know	9
	100

Types of Pollution	Percent
smog	45
ice fog	18
water, thermal	15
other	7
a little	10
a lot	5
	100

Number of Respondents: 434

[1] Percentages reported are based on the total number of products mentioned, not the number of respondents, since each respondent could give more than one answer.

Survey respondents had the opportunity to revise their speficic expectations about growth in Fairbanks based on the assumption that a petrochemical plant would be built in the Fairbanks area. Table 4-3 compares these expectations with those given under the assumption that no petrochemical plant would be built. A comparison of the distributions presented in Table 4-3 reveals a number of major changes in growth expectations. For example, 26 percent of the Fairbanks population expects the amount of air pollution to increase very rapidly if a petrochemical plant is built compared to 13 percent if no plant is constructed. While less than one percent of the population expect the number of jobs related to industry to increase very rapidly with no petrochemical plant, 14 percent expect this rate of growth as a result of petrochemical development. Similar shifts in expectations can be observed in Table 4-3 for the number of locally made products, stores, personal job opportunities, people living in Fairbanks and in the amount of taxable property.

It is difficult to summarize the effects of petrochemical development on each community attribute using the distributions reported in Table 4-3 since the general growth expectations vary so widely. The expected effects of petrochemical development can be more easily seen in the set of pie charts produced in Figure 4-1. The area within each circle represents the maximum rate of increase that can be expected; thus, if every Fairbanks resident expected a community attribute to change very rapidly over the next ten years, the entire circle would be filled. In other words, 100 percent of the maximum rate of increase is expected. None of the fourteen community attrubites are universally expected to increase at the maximum rate. Each chart shows the percentage of the maximum rate of increase that is expected without petrochemical development and the additional percentage of the maximum rate that is expected to result from petrochemical development. Taking the amount of air pollution as an example, Fairbanks residents expect the amount of air pollution to increase at 47 percent of the maximum rate without petrochemical development. When petrochemical development is assumed an additional 13 percent of the maximum rate of increase is expected. Overall, then, the amount of air pollution is expected to increase at 60 percent of the maximum rate.

Of course, the maximum rate of increase is not an absolute value corresponding to the maximum increase expected for any particular physical measure such as the density of the ice fog or the number of particulates in the air. Rather, the maximum rate of increase reflects whatever the public perceives is meant by a "very rapid increase." Public perceptions of this sort are extremely valuable tools in assessing the degree of change expected. It is often impossible to estimate how much a physical attribute (ice fog, for example) must change before the general public becomes aware of the change. Public perceptions of change, however, often more directly affect public policies than the objective changes themselves. By letting the public define the scale used to assess change, we can avoid this problem yet still obtain a good indication about the rate at which a given community attribute is expected to change.

TABLE 4-3

Public Expectations for Growth in Fairbanks
With and Without Petrochemical Development
(percent distributions)

	Stay about the same	Increase slowly	Increase rapidly	Increase very rapidly	
distance you have to go to find good HUNTING & FISHING	(WITHOUT) 25	22	35	18	= 100
	(WITH) 21	19	37	23	= 100
amount of PROPERTY taxed by the Borough	10	52	29	9	= 100
	5	32	51	12	= 100
amount of ice fog and other forms of AIR POLLUTION	16	43	28	13	= 100
	9	24	41	26	= 100
number of PEOPLE living in Fairbanks	8	63	27	2	= 100
	5	45	43	7	= 100
distance you have to go to find a good location for HOUSING	22	50	24	4	= 100
	21	36	32	11	= 100
number of jobs related to INDUSTRY	16	62	22	-	= 100
	3	34	49	14	= 100
distance you have to go to find OUTDOOR RECREATION opportunities	36	31	25	8	= 100
	29	27	33	11	= 100
quality of ROAD, RAIL, and AIR connections to Fairbanks	26	52	19	3	= 100
	18	44	34	4	= 100
number of jobs related to TOURISM	32	49	17	2	= 100
	29	45	23	3	= 100
number of STORES and shopping centers	27	59	13	1	= 100
	17	52	28	3	= 100
amount of SERVICES provided by the Borough	29	54	15	2	= 100
	23	50	23	4	= 100
number of jobs related to AGRICULTURE	40	47	12	1	= 100
	34	48	15	3	= 100
number of locally made PRODUCTS available	36	55	8	1	= 100
	16	48	31	5	= 100
the number of JOB OPPORTUNITIES FOR YOU	46	39	12	3	= 100
	34	35	24	7	= 100

Number of Respondents without Petrochemical Development: 202[1]
Number of Respondents with Petrochemical Development: 430

[1]While the entire sample consists of 436 respondents, the results reported here only include those respondents who were not assuming that a petrochemical plant would be built in the Fairbanks area. Note that this question was asked before any reference was made to petrochemical development in the interview itself.

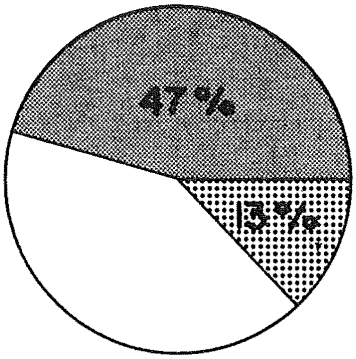
FIGURE 4-1

PERCENT OF MAXIMUM RATE OF CHANGE EXPECTED WITH & WITHOUT PETROCHEMICAL DEVELOPMENT FOR 14 COMMUNITY ATTRIBUTES

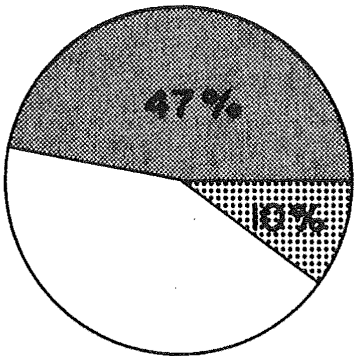
PERCENT OF MAXIMUM RATE OF INCREASE EXPECTED WITHOUT PETROCHEMICAL DEV.

PERCENT OF MAXIMUM RATE OF INCREASE EXPECTED WITH PETROCHEMICAL DEV.

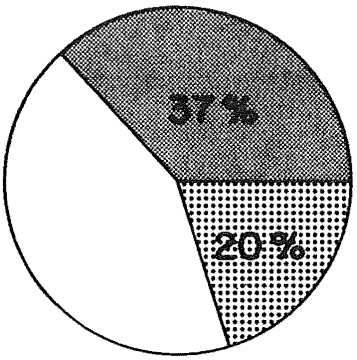
PERCENT OF MAXIMUM RATE OF INCREASE NOT EXPECTED FROM EITHER GENERAL GROWTH OR PETROCHEMICAL DEVELOPMENT



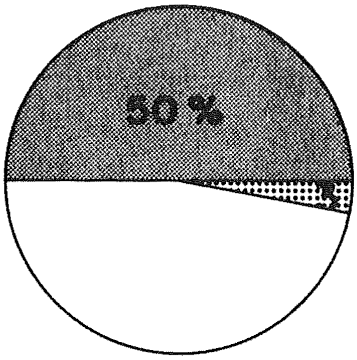
AMOUNT OF ICE FOG AND OTHER FORMS OF AIR POLUTION



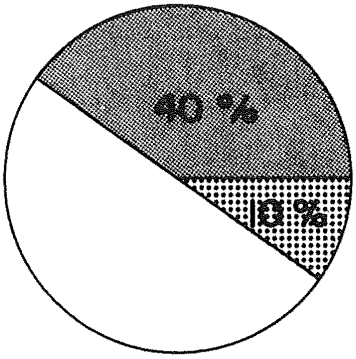
AMOUNT OF PROPERTY TAXED BY THE BOROUGH



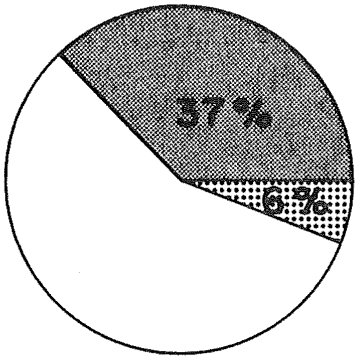
NUMBER OF JOBS RELATED TO INDUSTRY



DISTANCE YOU HAVE TO GO TO FIND GOOD HUNTING AND FISHING

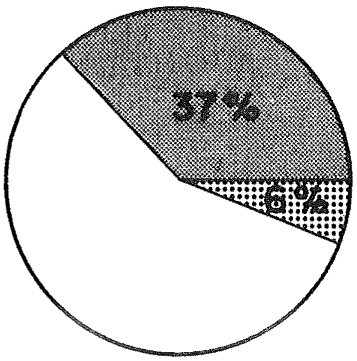


NUMBER OF PEOPLE LIVING IN FAIRBANKS

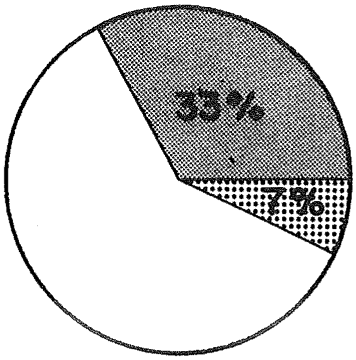


DISTANCE YOU HAVE TO GO TO FIND A GOOD LOCATION FOR HOUSING

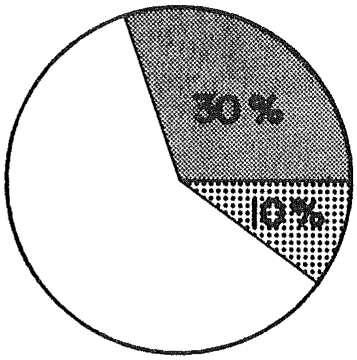
[1]Thirty-three percent represents a slow rate of increase, while 66% corresponds to a rapid rate of increase and 100% would indicate a very rapid rate of expected increase.



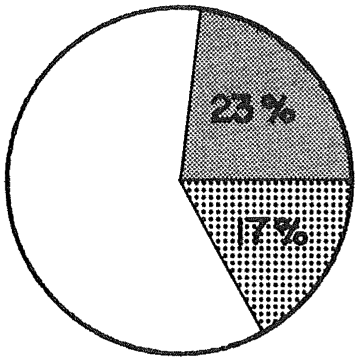
DISTANCE YOU HAVE TO GO TO FIND OUTDOOR RECREATION OPPORTUNITIES



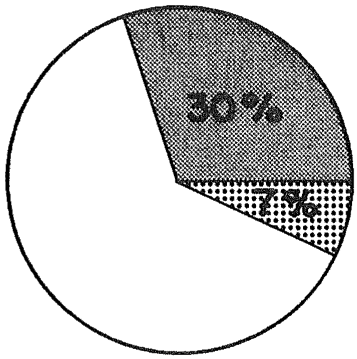
QUALITY OF ROAD, RAIL, AND AIR CONNECTIONS TO FAIRBANKS



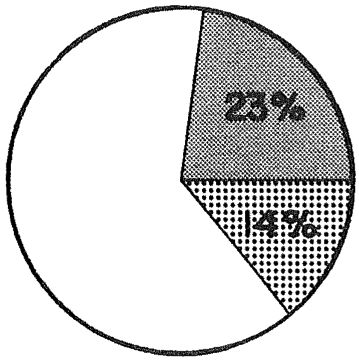
NUMBER OF STORES AND SHOPPING CENTERS



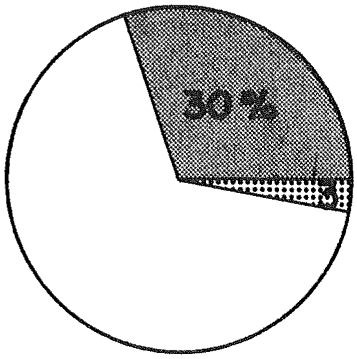
NUMBER OF LOCALLY MADE PRODUCTS AVAILABLE



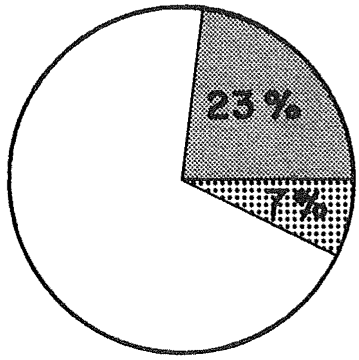
AMOUNT OF SERVICES PROVIDED BY THE BOROUGH



THE NUMBER OF JOB OPPORTUNITIES FOR YOU



NUMBER OF JOBS RELATED TO TOURISM



NUMBER OF JOBS RELATED TO AGRICULTURE

Since the individual effects of petrochemical development on each community attribute can easily be seen in Figure 4-1, there is no need to discuss them further here. We should attempt, however, to summarize the pattern of effects resulting from petrochemical development. Again, the best way to do this is to focus on the relative rates of increase among the fourteen community attributes. The first column in Table 4-4 lists the fourteen community attributes in order from highest to lowest percent of the maximum rate of change, assuming no petrochemical plant is built. The community attributes are reordered in column two to highlight the most important expected effects of a petrochemical plant. The figures appearing in column two correspond to the percentage of the maximum rate of increase attributable to petrochemical development. The ordering of community attrubites in the third colums in turn indicates the cumulative impact of petrochemical development and general growth.

As a review of the three columns in Table 4-4 will indicate, community attributes which appear at the top of one column do not necessarily appear in the other two columns. Differences in the relative position of a given attribute in the three columns have an important meaning. Petrochemical development is not expected to have the same effects on community attributes as general growth. Some of the attributes which are not expected to rapidly change under general growth assumptions are expected to be directly affected by petrochemical development. Jobs related to industry is one example. The number of locally made products is another. While a petrochemical plant is expected to affect the number of jobs in industry and locally made products more than any other community attribute, one cannot conclude that these two attributes are expected to change the most rapidly in the community as a whole. This is because each community attribute is influenced by general growth trends as well as petrochemical development. In the case of air pollution, both general growth and petrochemical development are expected to cause rapid increases. As a result, air pollution is expected to increase more rapidly than any other community attribute, at 60 percent of its maximum rate. The net expected effect of petrochemical development on the number of locally made products is quite different. In this case, little increase is expected under general growth conditions. Even though the number of locally made products is expected to increase if a petrochemical plant is built, the combined effects of general growth and petrochemical development only result in a rate of increase that is 40 percent of the maximum. In relative terms, locally made products is still not among the community attributes expected to increase most rapidly. Expectations about increases in the number of personal job opportunities follow a similar pattern.

The distance one must go to find good hunting and fishing is hardly expected to increase at all as a result of petrochemical development. Since the distance is expected to increase rapidly under general growth conditions, however, this community attribute remains among those expected to rapidly change when the effects of general growth and petrochemical development are combined.

TABLE 4-4

Comparison of Rates of Increase

General Growth Without Petrochemical Development		Effects of Petrochemical Development		Sum of General Growth and Petrochemical Effects	
Community Attribute	Percent of Maximum Rate of Change	Community Attribute	Percent of Maximum Rate of Change	Community Attribute	Percent of Maximum Rate of Change
distance you have to go to find good HUNTING & FISHING	50	number of jobs related to INDUSTRY	20	amount of ice fog and other forms of AIR POLLUTION	60
amount of PROPERTY taxed by the Borough	47	number of locally made PRODUCTS available	17	amount of PROPERTY taxed by the Borough	57
amount of ice fog and other forms of AIR POLLUTION	47	the number of JOB OPPORTUNITIES FOR YOU	14	number of jobs related to INDUSTRY	57
number of PEOPLE living in Fairbanks	40	amount of ice fog and other forms of AIR POLLUTION	13	distance you have to go to find good HUNTING & FISHING	53
distance you have to go to find a good location for HOUSING	37	amount of PROPERTY taxed by the Borough	10	number of PEOPLE living in Fairbanks	50
number of jobs related to INDUSTRY	37	number of PEOPLE living in Fairbanks	10	distance you have to go to find a good location for HOUSING	43
distance you have to go to find OUTDOOR RECREATION opportunities	37	number of STORES and shopping centers	10	distance you have to go to find OUTDOOR RECREATION opportunities	43
quality of ROAD, RAIL, and AIR connections to Fairbanks	33	quality of ROAD, RAIL, and AIR connections to Fairbanks	7	quality of ROAD, RAIL, and AIR connections to Fairbanks	40
number of jobs related to TOURISM	30	amount of SERVICES provided by the Borough	7	number of STORES and shopping centers	40
number of STORES and shopping centers	30	number of jobs related to AGRICULTURE	7	number of locally made PRODUCTS available	40
amount of SERVICES provided by the Borough	30	distance you have to go to find a good location for HOUSING	6	amount of SERVICES provided by the Borough	37
number of jobs related to AGRICULTURE	23	distance you have to go to find OUTDOOR RECREATION opportunities	6	the number of JOB OPPORTUNITIES FOR YOU	37
number of locally made PRODUCTS available	23	distance you have to go to find good HUNTING & FISHING	3	number of jobs related to TOURISM	33
the number of JOB OPPORTUNITIES FOR YOU	23	number of jobs relating to TOURISM	3	number of jobs related to AGRICULTURE	30

Another perspective on the role of petrochemical development in changing the pattern of growth expectations is presented in Figure 4-2. The average rates of change expected with and without petrochemical development are plotted for each community attribute. By connecting the two attribute expectations, we can see how the growth pattern changes, with some attributes expected to increase at a much faster rate than others.

When we viewed the pattern of expected changes in the context of public attitudes toward each type of change in Chapter Three, we found that Fairbanks residents are fairly pessimistic. They generally expect the less desirable community attributes to increase more rapidly than the more desirable attributes (see Figure 3-2). Petrochemical development appears to be expected to cause relatively greater increases in three desired community attributes: jobs related to industry, the number of locally made products and personal job opportunities (see Table 4-4). The fourth greatest expected increase is in the amount of air pollution which is the least desirable attribute in the public's view. It should be recalled, however, that public attitudes toward air pollution are complex. While it is viewed as most undesirable and expected to increase rapidly, air pollution does not figure as an important attribute in the prediction of an overall assessment of community change. The public may be taking a fatalistic attitude toward air pollution; assuming that it will inevitably get worse, they may be attempting to ignore it. Perhaps if they were convinced that the amount of air pollution can, in fact, be significantly controlled their concern would increase.

Turning now from what the general public expect to result from petrochemical development, what is their overall attitude? The overall response distribution to the question about whether a petrochemical plant will make Fairbanks a better or worse place to live is somewhat different than that obtained to the comparable question on general growth expectations (see Table 4-5). Slightly fewer residents expect Fairbanks will be a better

TABLE 4-5

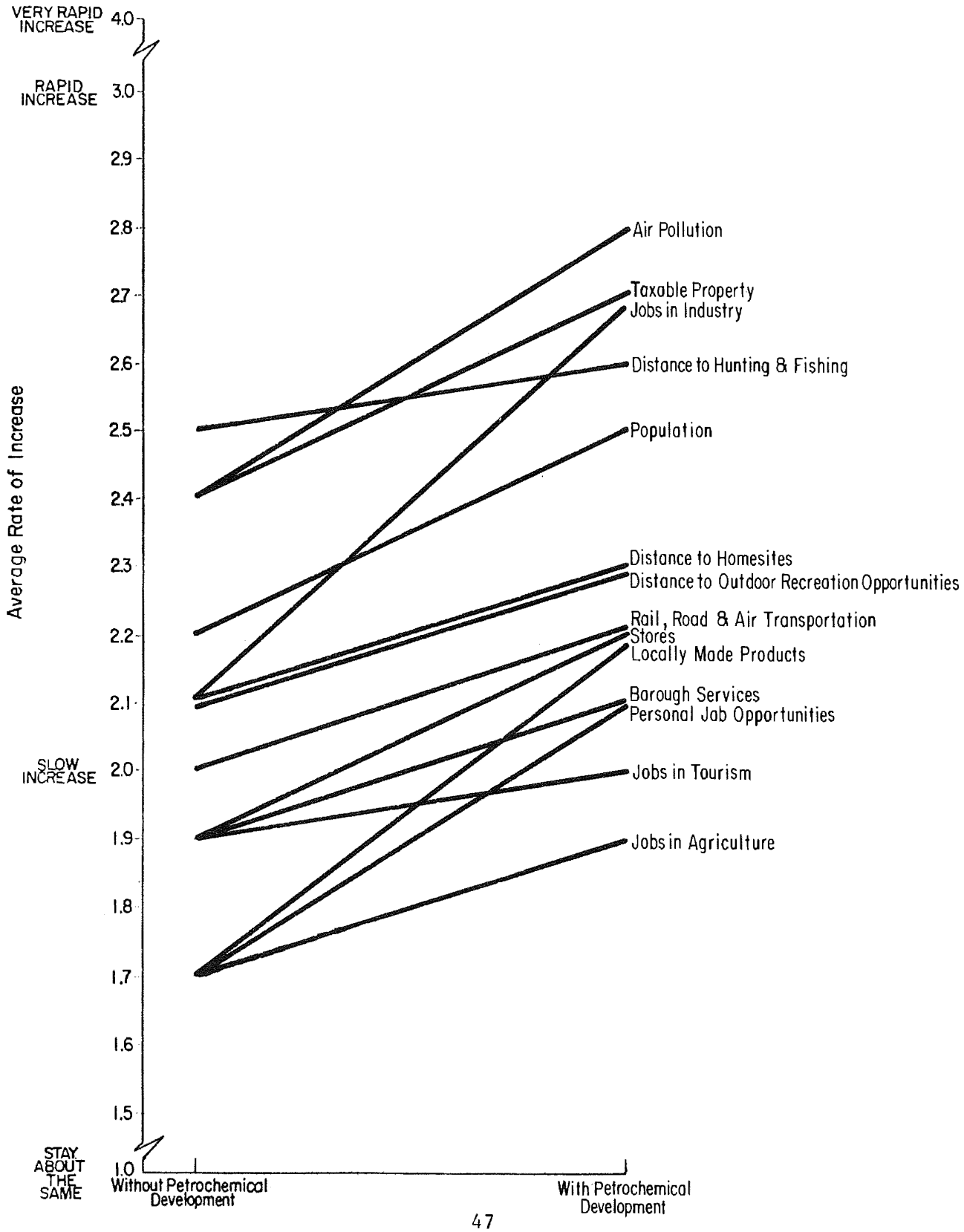
Comparison of Overall Assessments of Change in Fairbanks in General and Assuming Petrochemical Development
(percent distribution)

	Expected General Pattern of Change	Expected Change with Petrochemical Development
Better place to live	33	29
Just as good	42	35
Worse place to live	24	29
Don't know	1	7
	100	100

Number of Respondents: 428

FIGURE 4-2

COMPARISON OF AVERAGE RATES OF EXPECTED CHANGE WITH & WITHOUT PETROCHEMICAL DEVELOPMENT



place or just as good a place to live if petrocemical development is assumed. A somewhat higher proportion of residents expect that Fairbanks will be a worse place to live. These differences are not significant, only suggestive. The net result of these shifts, however, is that as many people expect Fairbanks will be a worse place to live if petrochemical development takes place as feel Fairbanks will be a better place to live. An additional important difference in responses to the two questions is in the proportion of residents who do not know what to expect from petrochemical development. While only 1 percent are unsure how to evaluate the general course of growth they expect, 7 percent are uncertain how to evaluate community change when petrochemical development is assumed.

The results presented in this chapter have confirmed our expectation that few people agree about the direct effects of petrochemical development. When asked to revise their expectations about community changes over the next ten years based on the assumption that a petrochemical plant would be built, survey respondents indicated that they tend to believe a petrochemical plant will create jobs, produce goods for local consumption and increase the amount of air pollution. Most other community attributes were expected to change at different rates as well. Overall, the same proportion of Fairbanks residents expect that a petrochemical plant would make Fairbanks a better place to live as expect it would make Fairbanks a worse place to live. Over a third of the population expects that petrochemical development won't affect their lives for the better or the worse and 7 percent simply don't know what to expect. We shall see in the next chapter how this assessment is changed by the information presented on petrochemical development.

Chapter Five

REVISED ATTITUDES AND EXPECTATIONS BASED ON THE PETROCHEMICAL DEVELOPMENT DESCRIPTION

Not unexpectedly, most Fairbanks residents (65 percent) found that at least some of the information presented in the petrochemical development description[5] differed from their own expectations (see Table 5-1). Many of the public estimates about the size, number of employees and products associated with a petrochemical plant (see Table 4-2) were more than ten times larger, or smaller, than the corresponding estimates contained within the description. When respondents were asked what specific aspects of our description differed from their own expectations, a significant number giving estimates at one extreme or the other indicated that they were aware of the discrepancies. For example, the results in part B of Table 5-1 show that 58 percent of those expecting the plant to employ over 1,000 people mentioned that they expected a larger number of jobs to be created. Fifty-three percent of those expecting the plant to be worth 50 million dollars or less mentioned that they expected a smaller plant to be built. Similar patterns for those expecting many products to be locally available and those expecting 300 jobs or less to be created can be seen in Table 5-1. It is encouraging to realize that it is indeed possible to present the public with a large body of information and find that people recognize on their own the difference between their specific expectations and those contained in the descriptive material. Residents were not only aware of these differences, they also expressed a great deal of interest in the information.

Although the estimates contained in the petrochemical description were substantially smaller than some initial public estimates and larger than others, certain aspects of the development description did surprise a significant number of residents. The major differences between public expectations and the petrochemical development description are summarized in Table 5-2. Most people expected the petrochemical facility would be smaller or at least to cost much less. Both more locally available products and more pollution were expected to result from petrochemical development.

Differences in employment expectations and the petrochemical description must really be viewed from two perspectives: construction employment and permanent employment. Generally, when respondents mentioned that they expected fewer people to be involved they were referring to the construction phase of petrochemical development. The idea that the

[5] For a detailed discussion about the content of the petrochemical description, see Chapter Two.

TABLE 5-1

Public Awareness of Differences Between Their Own Expectations and Estimates Contained in the Petrochemical Development Description
(percent distributions)

A. Differences between expectations & description	Percent
yes	65
no	35
	100
Number of Respondents: 427	

B. Effect of description on expectations

Original employment estimate	Percent who mentioned that they expected a larger number of jobs
300 employees or less	2
301-500 employees	7
501-1000 employees	11
over 1000 employees	58

Original employment estimate	Percent who mentioned that they expected a smaller number of jobs
100 employees or less	20
101-300 employees	38
over 300 employees	5

Original cost estimate	Percent who mentioned that they expected a smaller plant or one that cost less
50 million or less	53
51-500 million	14
over 500 million	8

Original mention of local products	Percent who mentioned that they expected more locally available products
three products mentioned	30
two products mentioned	19
one product mentioned	13
no products mentioned	8

TABLE 5-2

Major Differences Between Public Expectations and the Petrochemical Development Description
(percent distributions)

	Percent[1]
Expected smaller plant and/or lower cost	18
Expected fewer people to be involved	16
Expected more pollution	13
Expected products to be available locally	12
Expected more jobs	8
Expected different type of plant	6
Expected smaller addition to Borough revenues	4
General mention of size differences	3
General mention of environmental differences	3
Other differences	17
	100

Number of Respondents: 276

[1]Percentages reported are based on the total number of differences mentioned, not the number of respondents, since each respondent could give more than one answer.

construction force might approach that locally employed during pipeline construction was a surprising and sobering thought to many. On the other hand, the larger than expected construction employment was welcomed by other respondents as an unexpected source of possible employment. References to the expectation that more jobs would be created were often made in the context of changes in employment opportunities not directly associated with the plant. In our 1976 survey we found that 33 percent of the Fairbanks heads of households felt that they had a better job due to pipeline activities while only 21 percent were actually employed by a pipeline company. Thus, perhaps 10 percent perceived that their jobs were indirectly related to the pipeline. The increase of only about 100 permanent jobs indirectly related to a petrochemical facility is clearly much lower than that associated with the pipeline construction phase. One suspects that a large number of those who expected more jobs would be created were erroneously drawing on their experience during the pipeline construction period. Their expectations concerning indirect employment would be more appropriate if applied to the construction phase of the petrochemical facility than to the operations phase.

Following the presentation of the petrochemical description, respondents were also asked for their views on the most important benefits and costs of petrochemical development. Job opportunities headed the list of benefits mentioned, followed by economic growth and stability (see Table 5-3). The unexpected size of the capital investment required, $810 to $860 million, caused many people to mention tax revenues as an additional benefit. Amazingly, 6 percent of our respondents continued to expect more products to become locally available, despite strong statements to the contrary in the petrochemical description.

A diverse set of important costs were mentioned with respect to petrochemical development (see Table 5-3). Undesirable effects associated with the construction phase were mentioned most often, followed by pollution and population increases. The feeling that petrochemical development will lower the quality of life in Fairbanks was expressed both directly and in a variety of indirect ways including: urbanization, social problems, loss of wilderness and environmental damage. Together, these references made up 29 percent of all mentions about the costs of petrochemical development.

The presentation of the petrochemical description resulted in a revised set of expectations about many of the fourteen major community attributes that formed the core of the interview. Differences in expectations from before to after the petrochemical description are highlighted in Figure 5-1. The largest shift in expectations was in the number of locally made products that would become available. Public expectations dropped by ten percent on the basis of the information presented. A substantial drop in expectations also occurred with respect to the amount of air pollution. The petrochemical description essentially eliminated smog, the major form of pollution expected by the public, as a likely result. Respondents were impressed by the estimated cost of a petrochemical facility, as is reflected by their expectation that the rate of increase in the amount of taxable property will be significantly more rapid than originally expected.

Expectations regarding four other community attributes experienced more moderate revisions. The smaller shifts fit well with the fact that changes in each attribute are in large part only indirectly related to the petrochemical facility itself. The quality of road, rail and air transportation, for example, can be expected to change as a result of the necessity of shipping most of all of the petrochemical products out of Fairbanks. The description did not mention that Alaska Railroad officials believe no major upgrading would be required to transport petrochemical products. The fact that railroad transportation of products is mentioned in the material presented to our respondents probably caused many to pay more attention to the possible spinoffs of petrochemical development with regard to the quality of transportation links to Fairbanks. As a result, a more rapid increase was expected.

In contrast to the quality of transportation links, expectations

TABLE 5-3

Perceived Benefits and Costs of Petrochemical Development
(percent distributions)

A. Perceived Benefits	Percent
One or more benefits	88
No benefits	12
	100

Number of Respondents: 420

B. Benefits Mentioned	Percent[1]
Jobs	43
Economic growth, stability	23
Tax revenues	14
More products available	6
Lower cost and/or greater availability of fuels	6
More services	4
Other benefits	7
	100[1]

C. Perceived Costs	Percent
One or more costs	77
No costs	8
Don't know	15
	100

Number of respondents: 420

D. Costs Perceived	Percent[1]
Construction effects	18
Pollution	15
Population increase	13
Lower quality of life	9
Environmental damage	7
Tax increases	5
Transportation problems	5
Social problems	4
High prices	4
Housing problems	4
Urbanization	4
Loss of wildlife, wilderness	4
Other	8
	100

[1]Percentages reported are based on the total number of benefits and costs mentioned, not the number of respondents, since each respondent could give more than one answer.

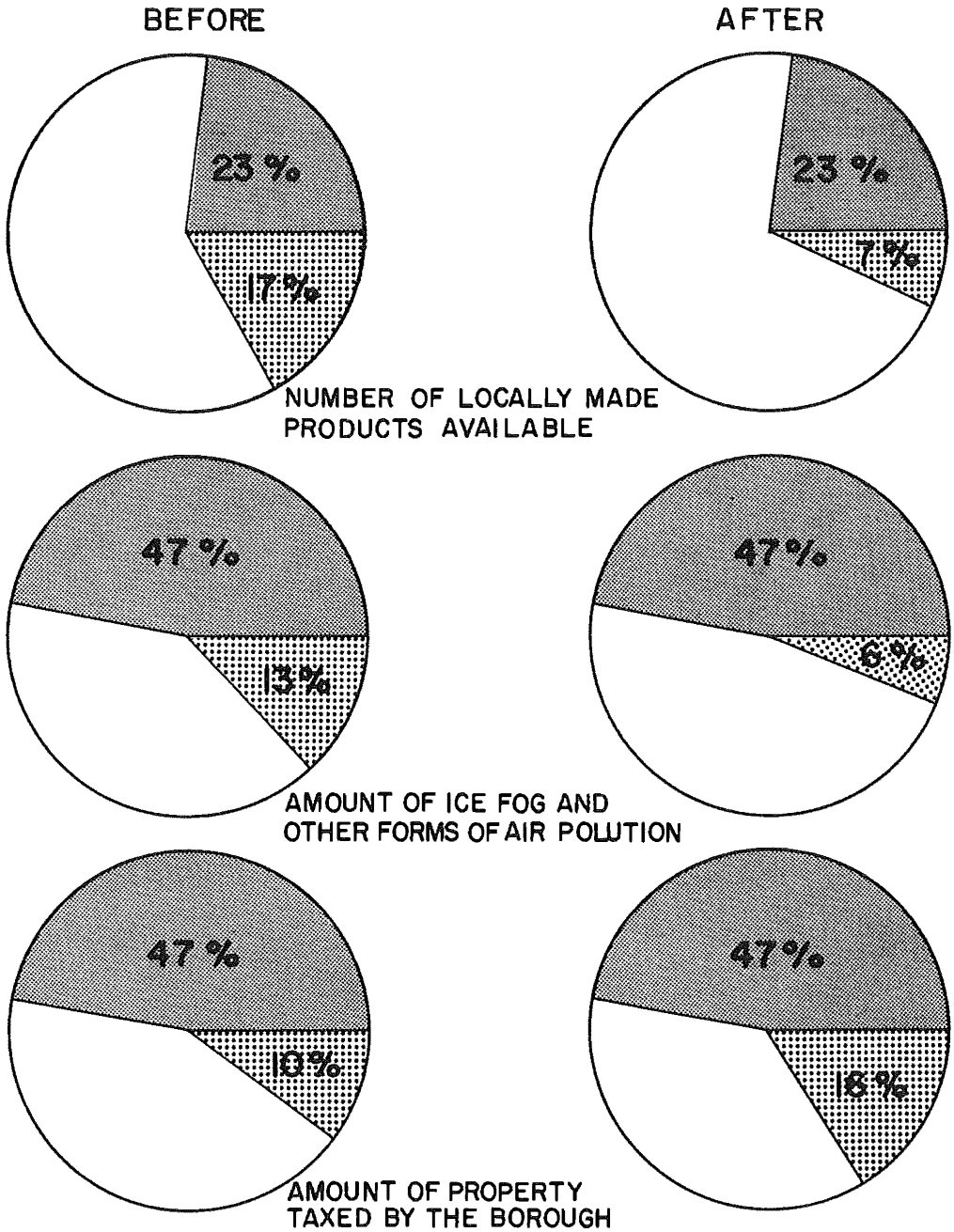
FIGURE 5-1

COMPARISON OF EXPECTED RATE OF CHANGE BEFORE AND AFTER PRESENTATION OF THE PETROCHEMICAL DESCRIPTION [1]

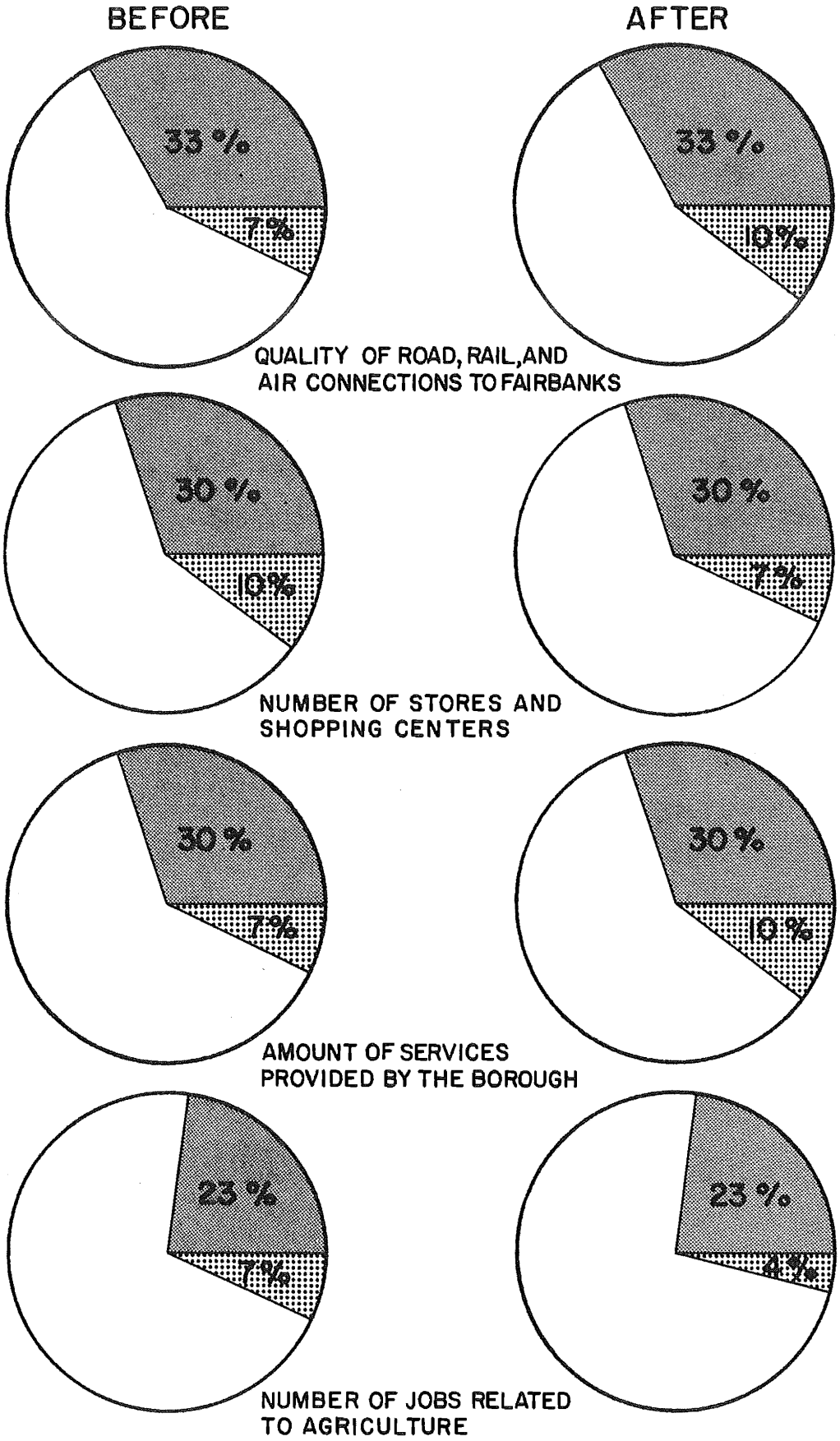
PERCENT OF EXPECTED RATE OF CHANGE BEFORE PETROCHEMICAL DESCRIPTION

PERCENT OF EXPECTED RATE OF CHANGE AFTER PETROCHEMICAL DESCRIPTION

PERCENT OF MAXIMUM RATE OF INCREASE NOT EXPECTED FROM EITHER GENERAL GROWTH OR PETROCHEMICAL DEVELOPMENT



[1]Numbers reflect percentages of the maximum rate of change that could be expected. Thirty-three percent represents a slow rate of increase, while 66% corresponds to a rapid rate of increase and 100% would indicate a very rapid rate of expected increase.


BEFORE
AFTER
33 %
7%
33 %
10%
QUALITY OF ROAD, RAIL, AND AIR CONNECTIONS TO FAIRBANKS
30 %
10%
30 %
7 %
NUMBER OF STORES AND SHOPPING CENTERS
30 %
7%
30 %
10 %
AMOUNT OF SERVICES PROVIDED BY THE BOROUGH
23 %
7%
23 %
4 %
NUMBER OF JOBS RELATED TO AGRICULTURE

about the rate of increase in the number of stores were revised downward. Two factors which may be respinsible for this shift are: one, a smaller than expected permanent population increase, and two, the smaller than expected number of indirect employment opportunities created by the facility.

Another indirect effect of petrochemical development altered by the descriptive material is that of the amount of Borough services. This attribute is expected to increase more rapidly in view of the dramatic increase in taxable property resulting from petrochemical development. Finally, the moderate increase in the number of jobs related to agriculture can be seen in Figure 5-1 to be even lower than initially expected. Again, the indirect effects of the fact that no products such as fertilizers are expected to become locally available are probably responsible for the change in expectations. The remaining 7 community attributes were not expected to increase at a different rate than initially indicated. The overall pattern of expectations of the general public can be compared with that of our informed sample in Figure 5-2. The major changes in expectations discussed above are evident in Figure 5-2 as well.

Now that we have established the differences in expectations between the general public and our informed sample, we need to directly compare public expectations about the general course of growth in Fairbanks with informed expectations about the effects of petrochemical development. Table 5-4 presents a comparable set of results to that given for the general public in Chapter Four. Again, the percentages appearing in the table reflect a proportion of the maximum rate of change that is expected to result first, from general growth trends, second, from petrochemical development over and above that expected from general growth, and third, the proportion of the maximum rate of change that is expected to cumulatively result from both general growth and petrochemical development.

The major effects of petrochemical development are seen by the informed public to be the creation of jobs related to industry and an increase in the amount of taxable property. A moderate increase in the number of personal job opportunities is also expected. Somewhat weaker effects are expected with regard to the number of people living in Fairbanks, the quality of transportation links and in the amount of services provided by the Borough. The number of locally made products available, the number of new stores, the amount of air pollution, and the distance one must go to find good housing or outdoor recreation opportunities are not expected to substantially increase as a result of petrochemical development. Petrochemical development is expected to cause little, if any, increase in the number of jobs related to agriculture or tourism or the distance one must go to find good hunting and fishing.

Still referring to Table 5-4, the cumulative effects of petrochemical development on the overall pattern of growth in Fairbanks can be observed in column three. In terms of relative rates of increase, petrochemical

FIGURE 5-2

COMPARISON OF AVERAGE RATE OF INCREASE EXPECTED

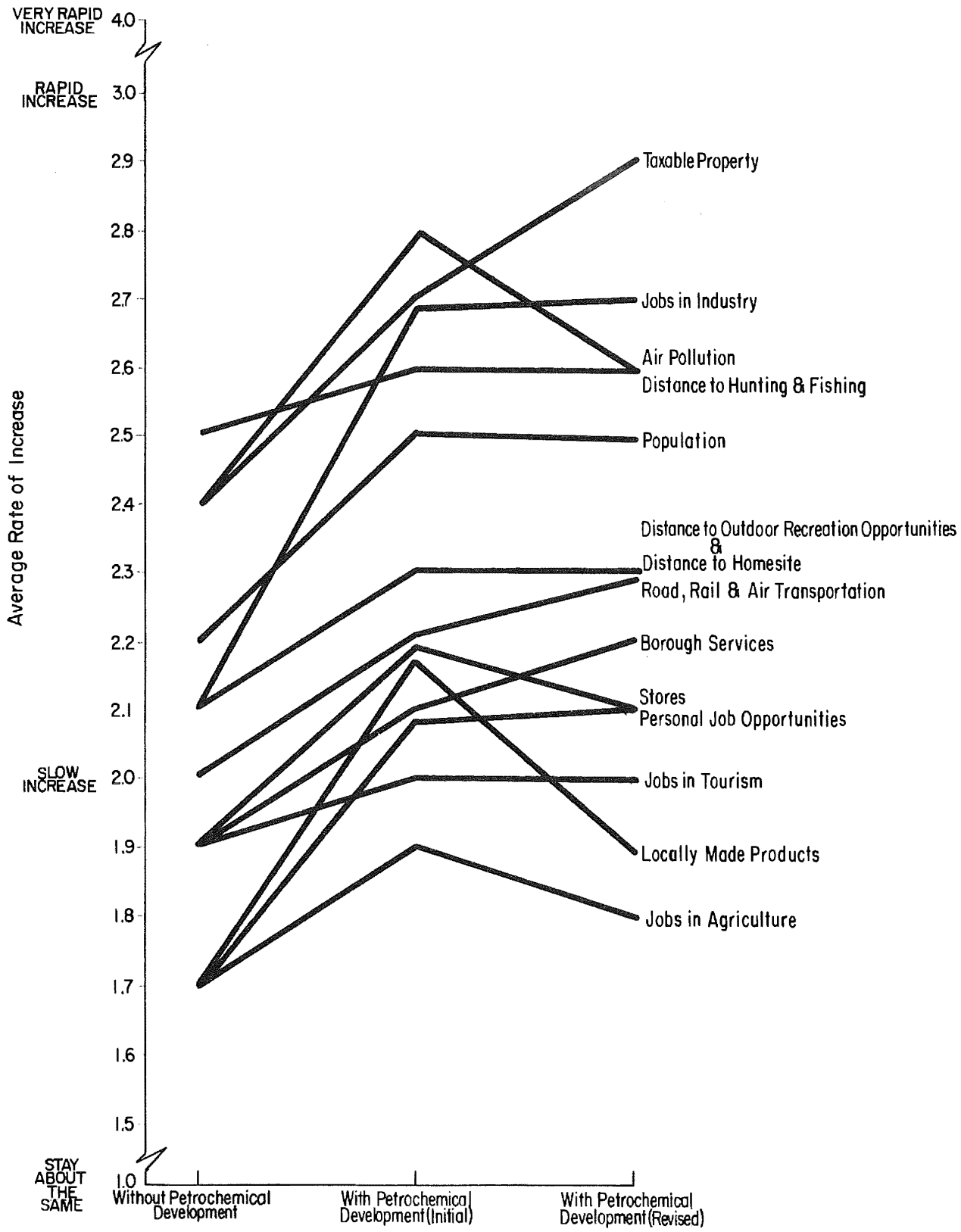


TABLE 5-4

Comparison of Rates of Increase

General Growth Without Petrochemical Development		Petrochemical Development Based on Petrochemical Description		Sum of General Growth and Petrochemical Effects	
Community Attribute	Percent of Maximum Rate of Change	Community Attribute	Percent of Maximum Rate of Change	Community Attribute	Percent of Maximum Rate of Change
distance you have to go to find good HUNTING & FISHING	50	number of jobs related to INDUSTRY	20	amount of PROPERTY taxed by the Borough	63
amount of PROPERTY taxed by the Borough	47	amount of PROPERTY taxed by the Borough	16	number of jobs related to INDUSTRY	57
amount of ice fog and other forms of AIR POLLUTION	47	the number of JOB OPPORTUNITIES FOR YOU	14	distance you have to go to find good HUNTING & FISHING	53
number of PEOPLE living in Fairbanks	40	number of PEOPLE living in Fairbanks	10	amount of ice fog and other forms of AIR POLLUTION	53
distance you have to go to find a good location for HOUSING	37	quality of ROAD, RAIL, and AIR connections to Fairbanks	10	number of PEOPLE living in Fairbanks	50
number of jobs related to INDUSTRY	37	amount of SERVICES provided by the Borough	10	distance you have to go to find a good location for HOUSING	43
distance you have to go to find OUTDOOR RECREATION opportunities	37	number of STORES and shopping centers	7	distance you have to go to find OUTDOOR RECREATION opportunities	43
quality of ROAD, RAIL, and AIR connections to Fairbanks	33	number of locally made PRODUCTS available	7	quality of ROAD, RAIL, and AIR connections to Fairbanks	43
number of jobs related to TOURISM	30	amount of ice fog and other forms of AIR POLLUTION	6	amount of SERVICES provided by the Borough	40
number of STORES and shopping centers	30	distance you have to go to find a good location for HOUSING	6	number of STORES and shopping centers	37
amount of SERVICES provided by the Borough	30	distance you have to go to find OUTDOOR RECREATION opportunities	6	the number of JOB OPPORTUNITIES FOR YOU	37
number of jobs related to AGRICULTURE	23	number of jobs related to AGRICULTURE	4	number of jobs related to TOURISM	33
number of locally made PRODUCTS available	23	distance you have to go to find good HUNTING & FISHING	3	number of locally made PRODUCTS available	30
the number of JOB OPPORTUNITIES FOR YOU	23	number of jobs related to TOURISM	3	number of jobs related to AGRICULTURE	27

development does not greatly alter the generally expected pattern of growth. The only attributes changing more than two positions in the ranking from most to least rapid rates of growth are the number of jobs related to industry, the number of personal job opportunities and the number of jobs related to tourism. The first two attributes mentioned improved their relative position while jobs related to tourism fell to a lower relative position. All 14 attributes are expected to increase at a faster rate with petrochemical development than without it.

We are now in a position to evaluate the expected effects of petrochemical development using informed public opinion and general public attitudes toward each major community attribute. Figure 5-3 duplicates the average expected rates of growth for each community attribute presented in Figure 3-2 in Chapter Three. Expectations for increased growth rates caused by petrochemical development are shown by striped extensions to each bar. As in Figure 3-2, the most desirable community attribute is located on the high point of the chart and the least desirable community attribute is located on the bottom. Consistent with our earlier discussion, Figure 5-3 documents the fact that petrochemical development is not seen to dramatically alter the basic mix of positively and negatively viewed community attributes. A slight shift away from the rather pessimistic pattern observed for general growth expectations is evident, particularly if our assumption is correct that the amount of taxable property is perceived as undesirable mainly because it is confused with the amount of peoperty taxes. The most desirable community attributes, however, still are not expected to increase as rapidly as the least desirable attributes.

Overall, the public attitude toward petrochemical development did not change due to the petrochemical description presented during the interview (see Table 5-5). As before the description, approximately the same proportion of our respondents expect that petrochemical development will make Fairbanks a better place to live as expect it will make Fairbanks a worse place to live. Individually, however, many attitude changes occurred. While few people changed from one extreme to the other, information presented in the petrochemical description apparently did alter some responses.[6]

Finally, Table 5-6 presents a breakdown of responses by key respondent characteristics. In reviewing the response distributions, it is evident that active voters view petrochemical development in a somewhat more favorable light than inactive or non-voters. Responses do not appear

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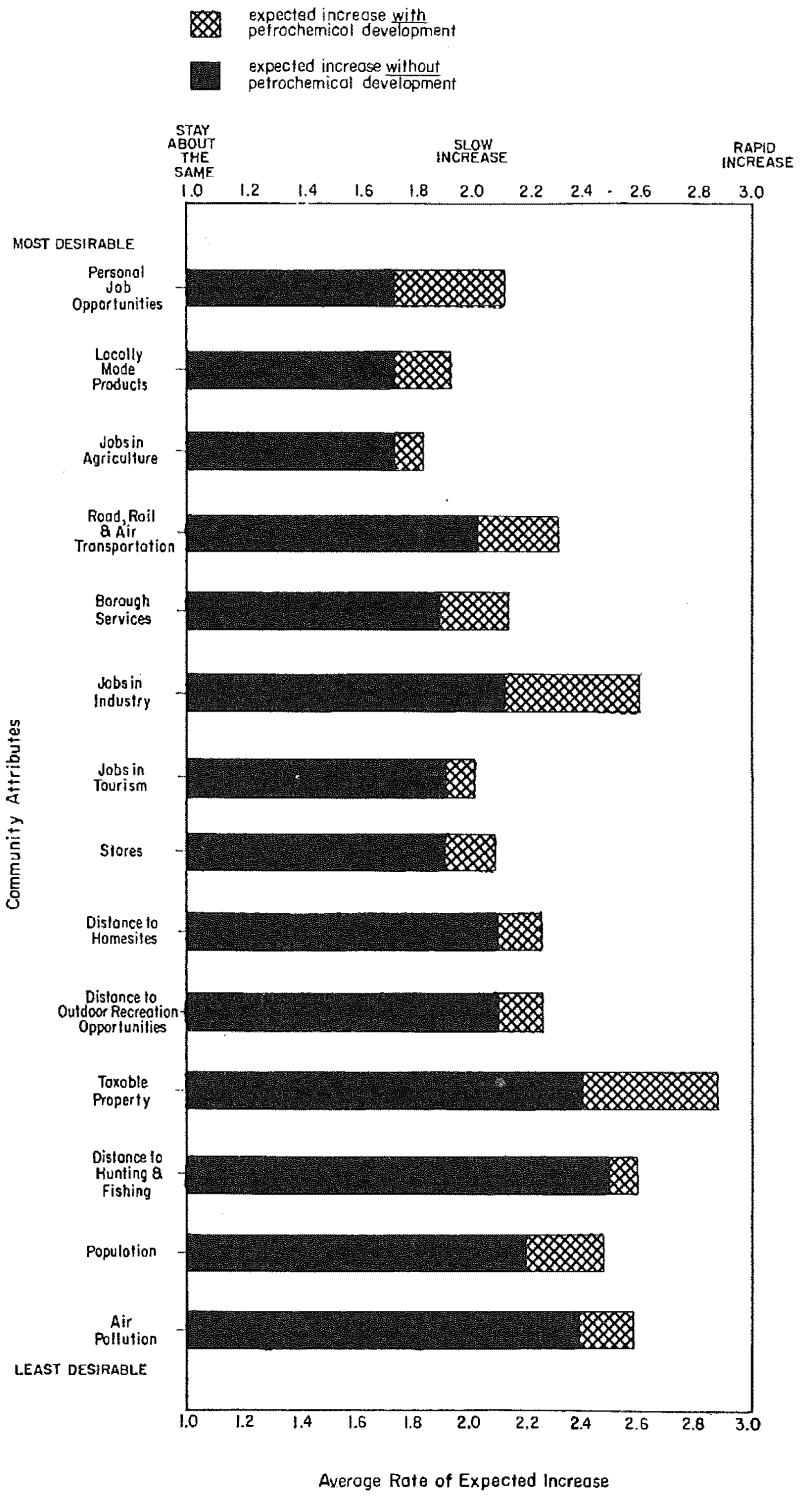
[6]Any time the same question is asked at two separate points in an interview, a small percentage of responses will differ simply because of carelessness on the part of the respondent or interviewer, due to change in the mood of the respondent or some other uncontrollable circumstance. An error rate of 2 or 3 percent is not uncommon. Thus, the shifts from better to worse and vice versa may in part be an artifact.

FIGURE 5-3

REVISED AVERAGE EXPECTATIONS FOR CHANGE ASSUMING PETROCHEMICAL DEVELOPMENT



[1]Bars indicate the average (mean) response for each item on a 4-point scale, whre "1" is stay about the same, "2" is increase slowly, "3" is increase rapidly, and "4" is increase very rapidly.

TABLE 5-5

Comparison of Overall Assessment of Changes Expected in Fairbanks

	Expected General Pattern of Change	General Public Expected Change with Petrochemical Development	Informed Public Expected Change with Petrochemical Development
Better place to live	33	29	28
Just as good	42	35	43
Worse place to live	24	29	26
Don't know	1	7	3
	100	100	100

Number of Respondents: 434

	--------Before Petrochemical Description------			
After Petrochemical Description	Better Place to Live	Just as Good	Worse Place to Live	Don't Know
Better place to live	69	13	7	17
Just as good	26	78	20	14
Worse place to live	4	8	71	38
Don't know	1	1	2	31
	100	100	100	100
Number of Respondents:	122	152	124	29

TABLE 5-6

Assessments of Changes with Petrochemical Development
by Key Respondent Characteristics
(percent distributions)

	Better Place to Live	Just as Good	Worse Place to Live		Percent of Fairbanks Population
All Informed Residents	29	44	27	= 100	
Voter Status					
Voted in 1977	35	41	24	= 100	47
Registered, didn't vote in 1977	26	41	33	= 100	24
Not registered	23	49	28	= 100	29
					100
Length of Residence					
Less than 4 years	32	33	35	= 100	29
4-10 years	27	36	37	= 100	34
More than 10 years	27	36	37	= 100	37
					100
Importance of Economic Opportunity					
Not important	18	37	45	= 100	18
Somewhat important	17	53	30	= 100	34
Important	45	36	19	= 100	21
Very important	38	46	16	= 100	27
					100
Importance of Being Near Wilderness and Being Self-Reliant					
Not important	42	43	15	= 100	31
Somewhat important	25	46	29	= 100	38
Important	21	49	30	= 100	17
Very important	19	39	42	= 100	14
					100
Importance of Living in a Small Community & Away from Urban Problems					
Not important	43	33	24	= 100	20
Somewhat important	30	51	19	= 100	35
Important	19	50	31	= 100	22
Very important	25	39	36	= 100	23
					100

Number of Respondents: 418

Note: The small proportion of residents who gave a don't know response (3 percent overall) are excluded from this table to facilitate group comparisons.

to significantly differ by length of residence in Fairbanks. Three respondent characteristics which do appear to be related to the assessment of petrochemical development all concern reasons that Fairbanks residents consider important for staying in Fairbanks. Residents who feel that economic opportunity is important are more likely to think petrochemical development will make Fairbanks a better place to live. Those who are staying in Fairbanks because of the surrounding wilderness environment, opportunities to be self-reliant or because they want to live in a small town away from urban problems are more likely to expect petrochemical development will make Fairbanks a worse place to live.

At the conclusion of our questions on petrochemical development, we asked respondents about a conceivable, yet highly unlikely petrochemical facility three times as large as that described.[7] Most residents indicated that they preferred the smaller plant over the larger plant (38 vs. 28 percent) while 34 percent indicated that they would rather have no plant at all. The pattern of responses to this question suggests that most of those who expect a petrochemical plant would make Fairbanks just as good a place to live would probably favor some form of petrochemical development. It should be remembered, however, the responses "better" and "just as good" do, in fact, express different levels of support for petrochemical development. Residents who expect that petrochemical development would not change the quality of their living environment clearly feel that they would neither benefit nor lose as a result of petrochemical development. If we weigh those who expect to benefit equally with those who expect to incur some cost from petrochemical development, then support for and opposition to petrochemical development is evenly split.

We have seen in this chapter that the description of petrochemical development presented to our survey respondents did have the desired effect of correcting much of the misinformation and reducing the confusion about petrochemical development. Several aspects of the dsecription differed from general public conceptions about petrocehmical development. First, the facility would cost more than expected and add a substantial amount to the local tax base. Second, the construction of the plant would involve more people than most people realized. Third, a petrochemical plant of the type most likely to be constructed in Fairbanks would not result in the smog expected by most residents. Finally, the plant would not result in many new products becoming available locally.

On the basis of the petrochemical description, residents modified their expectations about changes in 7 of the 14 major community attributes. More rapid increases were expected in the amount of taxable property, the quality of transportation links to Fairbanks and in the amount of Borough services provided. Less rapid increases were expected for the number of locally available products, the amount of air pollution, the number of new stores and the number of jobs related to agriculture.

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[7] This facility corresponds to Dr. Tussing's fourth scenario discussed in Chapter Three.

The cumulative effect of petrochemical development and generally expected growth is somewhat greater than that without petrochemical development but does show a similar pattern. Public attitudes, however, do vary according to whether petrochemical development is assumed; fewer people think Fairbanks will be a better place to live and more people think Fairbanks will be a worse place to live if petrochemical development is assumed. The net result, however, is that our informed sample of Fairbanks residents is equally divided on whether they think petrochemical development will make Fairbanks a better or worse place to live, with 43 percent expecting that petrochemical development would not affect Fairbanks one way or the other.

Chapter Six

ATTITUDES TOWARD ALTERNATIVE GOVERNMENT ACTIONS WITH REGARD TO PETROCHEMICAL DEVELOPMENT

The economic feasibility of petrochemical development in the Fairbanks area has yet to be determined. Several facts, however, are commonly known. First, it will cost much more to build a plant in Fairbanks than it would to build the same plant on the Gulf Coast or even at tidewater in Alaska. Second, it will also cost more to operate the plant. Third, the products will have to be shipped to tidewater and then out of Alaska, so transportation costs will be high. On the other side, feedstocks may be cheaper in Fairbanks if the full pipeline tariff is not charged. The State may wish to take its royalty share of the natural gas in kind rather than in value; if it does, Fairbanks is a logical location to take out the royalty gas.

Given the fact that a Fairbanks petrochemical facility would probably be in a poor competitive position if it had to pay an average price for its feedstocks, we must assume that some factor or set of factors can provide counterbalancing economic incentives. One factor is the price of the feedstocks in Fairbanks. Since Fairbanks residents will clearly have no say about the market value of the gas, it is not a matter about which we need a public assessment. Other factors do, however, involve government expenditures which clearly are of public interest. This chapter assesses public support for some of the most likely forms of economic incentives that the Fairbanks North Star Borough and the State of Alaska could marshall in support of petrochemical development.

The weakest incentive the Borough can provide is a favorable attitude toward development. Beyond this, the Borough can actively solicit proposals from petrochemical firms. The current agreement with Foster and Marshall is an obvious example of this approach. The Borough can also develop information which is helpful to companies assessing the feasibility of development here. The Borough planning department study of potential locations for petrochemical development is a relevant example. Encouragement and information cost the Borough comparatively little on the one hand, but do little to alter the basic economic factors which will determine whether a facility is feasible. Nevertheless, an advocacy policy on the part of the Borough may affect the lives, if not the pocketbooks, of its residents. When we asked our respondents if they want the Borough to invite petrochemical companies to make proposals and to collect information that they need, 67 percent said yes (see Table 6-1). In fact, most population groups appear to support these Borough activities.

At first glance, strong support for these Borough actions intended to promote petrochemical development seems at odds with the finding

TABLE 6-1

Support for Borough Inviting Petrochemical Company Proposals and Supplying Information
(percent distributions)

Question: A petrochemical company might be more likely to locate in Fairbanks if the Borough actively invited petrochemical companies to make proposals and helped them collect the information they need. Do you think the Borough should help in this way?

	Yes	No	Don't Know	Number of Respondents
A. Informed Population	67	26	7 = 100	434
B. By Voter Status				
Voted in 1977	69	26	5 = 100	201
Registered, didn't vote	67	22	11 = 100	102
Not registered	63	31	6 = 100	124
C. By Length of Residence				
Less than 4 years	70	23	7 = 100	124
4 to 10 years	61	32	7 = 100	150
More than 10 years	70	24	6 = 100	160
D. By Importance of Economic Opportunity				
Not important	47	49	4 = 100	78
Somewhat important	60	31	9 = 100	149
Important	75	17	8 = 100	92
Very important	82	13	5 = 100	115
E. By Importance of Wilderness and Alternative Lifestyle Opportunities				
Not important	76	14	10 = 100	136
Somewhat important	62	32	6 = 100	164
Important	64	31	5 = 100	74
Very important	64	33	3 = 100	60
F. By Importance of Small Community Environment				
Not important	68	23	9 = 100	84
Somewhat important	66	25	9 = 100	151
Important	71	27	2 = 100	98
Very important	65	30	5 = 100	98

reported in Chapter Five that only 29 percent of the Fairbanks population think petrochemical development will make Fairbanks a better place to live. As we mentioned earlier, the difference is accounted for by the leanings of those who expect that a petrochemical plant would make Fairbanks neither a better or a worse place to live. Support for petrochemical development can be assessed in two ways. If we count those who would just as soon have it as not, then there is a large amount of support but it is "soft" in the sense that many don't feel they personally would be affected one way or the other. If we count those who expect to gain on the one hand and those who expect to lose on the other, the issue is a draw but the leanings of 43 percent of the population are ignored. The question that cannot be answered by the survey is what set of weights should be used to equitably deal with different intensities of support. Survey results do provide the measures necessary to assess support and opposition to petrochemical development from a variety of perspectives. Since there is not a concensus, however, an equitable solution will require a trade-off between the views of 28 percent of the population who expect petrochemical development will make Fairbanks a worse place to live and 43 percent of the population who don't expect to gain or lose as a result of petrochemical development, but who support it anyway.

Residents were also asked for their opinions on several incentives that are stronger than that provided by adopting an advocacy stance. Petrochemical facilities of the type most likely to be developed in Fairbanks are attractive to most communities which want to avoid rapid growth and its negative effects but also want to avoid increasing the tax burden on local residents. They employ relatively few people in comparison to the massive capital investment required, and are one of the cleanest forms of industry. As a result, communities are likely to compete for such plants. The location of a petrochemical facility is, of course, in part dependent on an assured supply of feedstocks but it is also dependent on a combination of transportation facilities and market considerations. There may well be more than one community within the range of possible locations. In this situation, it is naturally in the best interest of the petrochemical company to minimize costs in whatever way possible. Since they are attractive industries, communities may be willing to trade off some potential benefits in order to induce the company to locate within their boundaries.

In Alaska, Fairbanks is one of the few communities which falls within the range of possible locations for a petrochemical facility, but it is not the only one. Particularly if the petrochemical products were transported by pipeline rather than rail, other sites along the proposed gas pipeline route but outside the Borough could be feasible locations. For this reason, relatively small but significant incentives could become important to a location decision.

One such incentive is to deliberately limit the amount of property taxes paid by the company. If the tax break is too large, the community winds up with a net cost after services are provided; if it is too low,

or nonexistent, the company might go elsewhere. While we cannot know now whether such an incentive is necessary or how large it might have to be, we can assess public support for the general form of incentive. When asked, most Fairbanks residents said no (see Table 6-2). Even among those staying in Fairbanks primarily for economic reasons, the observed level of support for a tax break incentive barely equalled the opposition.

Another, perhaps more convincing, incentive is available to local governments. Providing the Internal Revenue Service approves, municipalities can sell revenue bonds in order to help finance development. The revenues derived from the bonds are not taxable and the effective interest rate for the borrowed money is lower than that for private capital. Since the federal government does not tax the interest on the bonds and must derive revenues from other sources, municipal revenue bonds in a sense are a federal development subsidy. Respondents were asked about this form of incentive and 35 percent supported it (see Table 6-3). Again, almost all population groups do not support the action. However, in this case, many residents indicated that they did not know enough about this form of incentive to have an opinion.

The final, and strongest, incentive addressed in the survey involves the price of the petrochemical feedstocks. Although Alaskans cannot do much to influence the value of the gas, the State can decide to sell its own share of the gas at less than full value. In this way, the State may make petrochemical development economically feasible, thereby creating jobs and revenues which otherwise would not exist. Of course, the State would also lose part of the revenues it would receive if it sold its gas at full value. Depending on the price and volume of gas, the sale of State royalty has might roughly generate 130 to 160 million dollars annually in revenues. Residents were asked if the State should sacrifice some of the money for the gas in order to have a petrochemical company locate in the State. Because it is conceivable that the price of feedstocks might have to approach zero in order to make petrochemical development feasible, residents were then asked if the State should sacrifice all of the money it would receive for the gas if that is the only way to attract a petrochemical company. The combined responses to these two questions are presented in Table 6-4. As with all but one of the other potential incentives, about a third of the population supports selling the gas at less than full value if that would result in petrochemical development but most people oppose the action. Almost no one would consider sacrificing all State revenues from the sale of its gas (see Table 6-4).

The results presented in this chapter indicate that most Fairbanks residents would like to encourage petrochemical development as long as it doesn't cost much to do so. Inviting companies to make proposals and providing information are Borough activities which the public believes are not expensive and should be pursued. Property tax breaks, the sale of municipal revenue bonds to help finance development and the sale of State royalty gas at less than full value are possible economic

TABLE 6-2

Support for Giving Tax Break
To Encourage Petrochemical Development
(percent distributions)

Question: A petrochemical company would be more likely to locate in the Fairbanks area if the plant were given a break on the amount of property taxes it paid to the Borough. Do you think the Borough should give a tax break to a petrochemical company if the company would then locate in Fairbanks?

	Yes	No	Don't Know	Number of Respondents
A. Informed Population	30	61	9 = 100	435
B. By Voter Status				
Voted in 1977	32	61	7 = 100	201
Registered, didn't vote	33	57	10 = 100	103
Not registered	22	67	11 = 100	124
C. By Length of Residence				
Less than 4 years	27	63	10 = 100	125
4 to 10 years	24	68	8 = 100	150
More than 10 years	38	54	8 = 100	160
D. By Importance of Economic Opportunity				
Not important	19	75	6 = 100	79
Somewhat important	19	72	9 = 100	149
Important	38	53	9 = 100	92
Very important	45	45	10 = 100	115
E. By Importance of Wilderness and Alternative Lifestyle Opportunities				
Not important	39	51	10 = 100	137
Somewhat important	30	62	8 = 100	164
Important	21	68	11 = 100	74
Very Important	22	74	4 = 100	60
F. By Importance of Small Community Environment				
Not important	40	49	11 = 100	85
Somewhat important	30	61	9 = 100	151
Important	30	60	10 = 100	98
Very important	22	73	5 = 100	98

TABLE 6-3

Support for Borough Selling Tax Free Bonds
to Encourage Petrochemical Development
(percent distributions)

Question: Another way to make Fairbanks more attractive to petrochemical companies is to offer to sell tax free bonds to help them finance the plant. In effect this is a state and federal subsidy and not a local subsidy. Do you think the Borough should offer to sell tax free bonds if this would attract a petrochemical company?

	Yes	No	Don't Know	Number of Respondents
A. Informed Population	36	48	16 = 100	435
B. By Voter Status				
Voted in 1977	39	47	14 = 100	201
Registered, didn't vote	33	49	18 = 100	103
Not registered	30	51	19 = 100	124
C. By Length of Residence				
Less than 4 years	36	46	18 = 100	125
4 to 10 years	35	51	14 = 100	150
More than 10 years	36	47	17 = 100	160
D. By Importance of Economic Opportunity				
Not important	20	67	13 = 100	79
Somewhat important	33	48	19 = 100	149
Important	38	46	16 = 100	92
Very important	47	38	15 = 100	115
E. By Importance of Wilderness and Alternative Lifestyle Opportunities				
Not important	41	38	21 = 100	137
Somewhat important	34	52	14 = 100	164
Important	30	55	15 = 100	74
Very important	33	54	13 = 100	60
F. By Importance of Small Community Environment				
Not important	44	38	18 = 100	85
Somewhat important	36	47	17 = 100	151
Important	33	52	15 = 100	98
Very important	31	55	14 = 100	98

TABLE 6-4

Support for State Selling Gas at Less than Full Value to Encourage In-state Petrochemical Development
(percent distributions)

Question: Finally, a petrochemical company would be more likely to locate in Alaska if it could purchase the State's royalty gas at a reduced rate. The full amount the state could receive for its gas is uncertain, but according to President Carter's national energy plan the value of the gas would be $134 million per year. Do you think the State should sacrifice some of the money it would receive for the gas in order to have a petrochemical plant locate in the State?

	Yes, All if Necessary	Yes	No	Don't Know	Number of Respondents
A. Informed Population	2	36	51	11 = 100	430
B. By Voter Status					
Voted in 1977	2	39	47	12 = 100	201
Registered, didn't vote	2	30	53	15 = 100	102
Not registered	3	31	58	8 = 100	122
C. By Length of Residence					
Less than 4 years	4	34	51	11 = 100	125
4 to 10 years	-	31	57	12 = 100	150
More than 10 years	2	41	46	11 = 100	155
D. By Importance of Economic Opportunity					
Not important	3	29	57	11 = 100	79
Somewhat important	1	32	56	11 = 100	148
Important	-	37	50	13 = 100	91
Very important	4	44	41	11 = 100	114
E. By Importance of Wilderness and Alternative Lifestyle Opportunities					
Not important	2	36	47	15 = 100	136
Somewhat important	1	41	47	11 = 100	164
Important	5	25	60	10 = 100	73
Very Important	-	32	59	9 = 100	59
F. By Importance of Small Community Environment					
Not important	1	41	50	8 = 100	84
Somewhat important	2	33	51	14 = 100	151
Important	3	34	50	13 = 100	94
Very important	1	38	52	9 = 100	98

incentives that are not supported by the majority of Fairbanks residents. The lack of support for these incentives appears to reflect the fact that most residents do not expect petrochemical development to make Fairbanks a better place for them to live. Roughly a third of the population does expect petrochemical development to make Fairbanks a better place to live and we find repeatedly that about a third of the population support incentives which involve some sacrifices.

Chapter Seven

CURRENT ECONOMIC CONDITIONS IN FAIRBANKS

It should be no surprise to anyone that the economic conditions in Fairbanks have changed since the peak of pipeline construction. We are able to document many of these changes on the basis of two surveys, the first being a sample of 415 Fairbanks households in the late spring of 1976 and the second being the survey just completed. Both surveys employed exactly the same sampling procedures and can be generalized to the same population.

Table 7-1 summarizes the changes in employment status of the total population, heads of household and for wives. Overall, approximately the same proportion of the population is employed. This rather surprising finding is actually a result of two opposing trends. While the percentage of heads of household working dropped from 83 to 75 percent, no doubt as a result of the completion of the pipeline, the percentage of working wives increased from 50 to 57 percent. The latter trend is one that can be observed nationally. It is important to note, however, that the decline in employment opportunities could well have forced women out of the labor force. The data suggest that this has not, in fact, occurred to a significant degree.

TABLE 7-1

Changes in Employment Status
1976-1978
(percent distributions)

	All Adults		Head of Household		Wife	
Employment Status	1976	1978	1976	1978	1976	1978
Working now	69	67	83	75	51	57
Temporarily laid off	2	2	3	4	-	1
Unemployed	6	14	7	17	6	9
Housewife	19	13	3[1]	-	39	31
Retired	2	2	3	3	1	-
Student	2	2	1	1	3	2
	100	100	100	100	100	100
Number of Respondents:	702	705	405	414	291	291

[1] In cases where the husband was away from home for an extended period (e.g., working on the pipeline), wives were classified as the "head of residence."

While the unemployment rate for heads of household appears to be 21 percent (see Table 7-1), when persons who do not have a job but do not want one are eliminated, the effective unemployment rate is 9 percent. This is one of the most important findings of the entire study; the apparent and actual unemployment estimates differ by 57 percent. Since most people who are unemployed are not looking for work, we cannot expect the lack of current employment opportunities to be a major stimulus to leave Fairbanks. Survey results tend to support this interpretation (see Table 7-2). If the proportion of active job seekers dramatically increases this summer and employment opportunities do not greatly increase, we may experience a substantial loss in population in the second half of 1978.

TABLE 7-2

Plans to Move from Fairbanks
by Employment Status
(percent distributions)

Plans to Move from Fairbanks	Head of Household Currently Unemployed	All Other Households
Within next 6 months	5	3
Within next 2 years	8	7
Sometime in the future	23	19
No plans to move	64	71
	100	100
Number of Respondents:	83	333

Table 7-3 shows that the occupational mix of all adults has not changed substantially in the last two years. A slight increase in the percentage of craftsman among heads of household may indicate a rise in general skill level in the construction trades but the shift is not significant and a number of alternative explanations could easily be offered. There does appear to be a significant decline among Fairbanks wives in clerical occupations and a continuation of the trend of increasing employment in professional technical positions.

The occupational mix of those employed appears to have shifted slightly away from the blue collar occupations and into white collar employment, particularly into service occupations (see Table 7-4). Most of this shift appears to be accounted for by differences in the occupations of wives rather than heads of household. Another indication of changing conditions for the employed is the decline in the average number of hours worked (see Table 7-4). Work effort among heads of households in Fairbanks declined 11 percent between 1976 and 1978.

TABLE 7-3

Changes in Occupation
1976-1978
(percent distributions)

Occupation of all Adults Regardless of Whether Employed[1]	All Adults		Head of Household		Wife	
	1976	1978	1976	1978	1976	1978
Professional, Technical	25	25	26	24	24	27
Managers & Administrators	12	11	12	10	10	11
Sales workers	4	4	4	4	4	5
Clerical	16	13	7	6	36	28
Craftsmen	17	19	22	27	6	3
Operatives, except transport	6	5	8	6	2	2
Transport equipment operators	6	5	8	8	2	1
Laborers	5	4	6	5	2	1
Service workers	9	14	7	10	14	22
	100	100	100	100	100	100
Number of Respondents:	562	589	386	382	176	207

[1]Respondents who are either employed, temporarily laid off or unemployed are included.

TABLE 7-4

Changes in Occupation and Hours Worked
Among the Employed
1976-1978
(percent distributions)

Occupation of Employed	All Adults		Head of Household		Wife	
	1976	1978	1976	1978	1976	1978
Professional, Technical	27	29	28	28	25	30
Managers & Administrators	12	12	13	12	9	12
Sales workers	4	6	4	5	5	7
Clerical	16	13	6	6	37	26
Craftsmen	19	16	24	24	7	2
Operatives, except transport	6	3	8	4	1	1
Transport equipment operators	5	5	7	7	2	1
Laborers	3	2	4	3	1	-
Service workers	8	14	6	11	13	21
	100	100	100	100	100	100
Average hours worked week prior to interview	48.7	43.5	52.4	46.8	40.2	37.3
Number of Respondents:	479	476	334	307	145	169

Among the unemployed, a large increase in the craftsman and operative categories between 1976 and 1978 can be observed (see Table 7-5). Substantial decreases in the percentage of persons unemployed with occupations in the service and transportation fields are also evident. Note, however, that there appears to be an increase in the demand for the service occupations (compare Tables 7-2, 7-3 and 7-4) while the smaller percentage of unemployed transport operatives is more likely the result of persons in that category leaving Fairbanks.

TABLE 7-5

Changes in Occupation Among the Unemployed
1976-1978
(percent distributions)

Occupation of Employed	All Adults		Head of Household		Wife	
	1976	1978	1976	1978	1976	1978
Professional, Technical	13	10	9	7	23	22
Managers & Administrators	8	6	3	4	18	13
Sales workers	4	-	6	-	-	-
Clerical	13	13	6	8	29	26
Craftsmen	11	35	11	42	6	13
Operatives, except transport	6	12	9	15	-	-
Transport equipment operatives	17	7	25	10	-	-
Laborers	11	11	17	11	-	9
Service workers	17	6	14	3	24	17
	100	100	100	100	100	100
Number of Respondents:	53	96	36	73	17	23

Table 7-6 compares the industry mix for the currently employed with the industry of last employment for the unemployed.[7] The decline in the importance of the construction industry and specifically in pipeline-related employment is readily apparent. Almost half of all the unemployed were employed in the construction industry or in a job related to the pipeline.

Survey respondents were asked directly whether the completion of the pipeline affected their job (see Table 7-7). Twenty-eight percent of the Fairbanks population worked directly for a pipeline company and 33 percent said the completion of the pipeline affected their job. The

[7]The figures reported in column one of Table 7-5 correspond almost exactly with the 1977 figures developed for the Fairbanks Labor Market Area by the Research and Analysis Section of the Employment Security Division, Alaska Department of Labor.

TABLE 7-6

Employment by Industry for Currently Employed and Unemployed
(percent distributions)

Industry	-----All Adults-----		--Head of Household-		-------Wife---------	
	Employed	Unemployed	Employed	Unemployed	Employed	Unemployed
Mining	2	1	2	1	2	2
Construction	9	36	14	39	1	34
Pipeline	4	13	5	16	2	10
Manufacturing	2	4	3	3	1	4
Transportation	11	9	14	9	6	9
Wholesale & Retail Trade	16	11	15	12	17	10
Finance	6	-	5	-	8	-
Services	19	15	13	11	29	19
Government	31	11	29	9	34	12
	100	100	100	100	100	100
Number of Respondents:	462	143	296	75	166	68

TABLE 7-7

Effects of Pipeline Completion on Employment
(percent distributions)

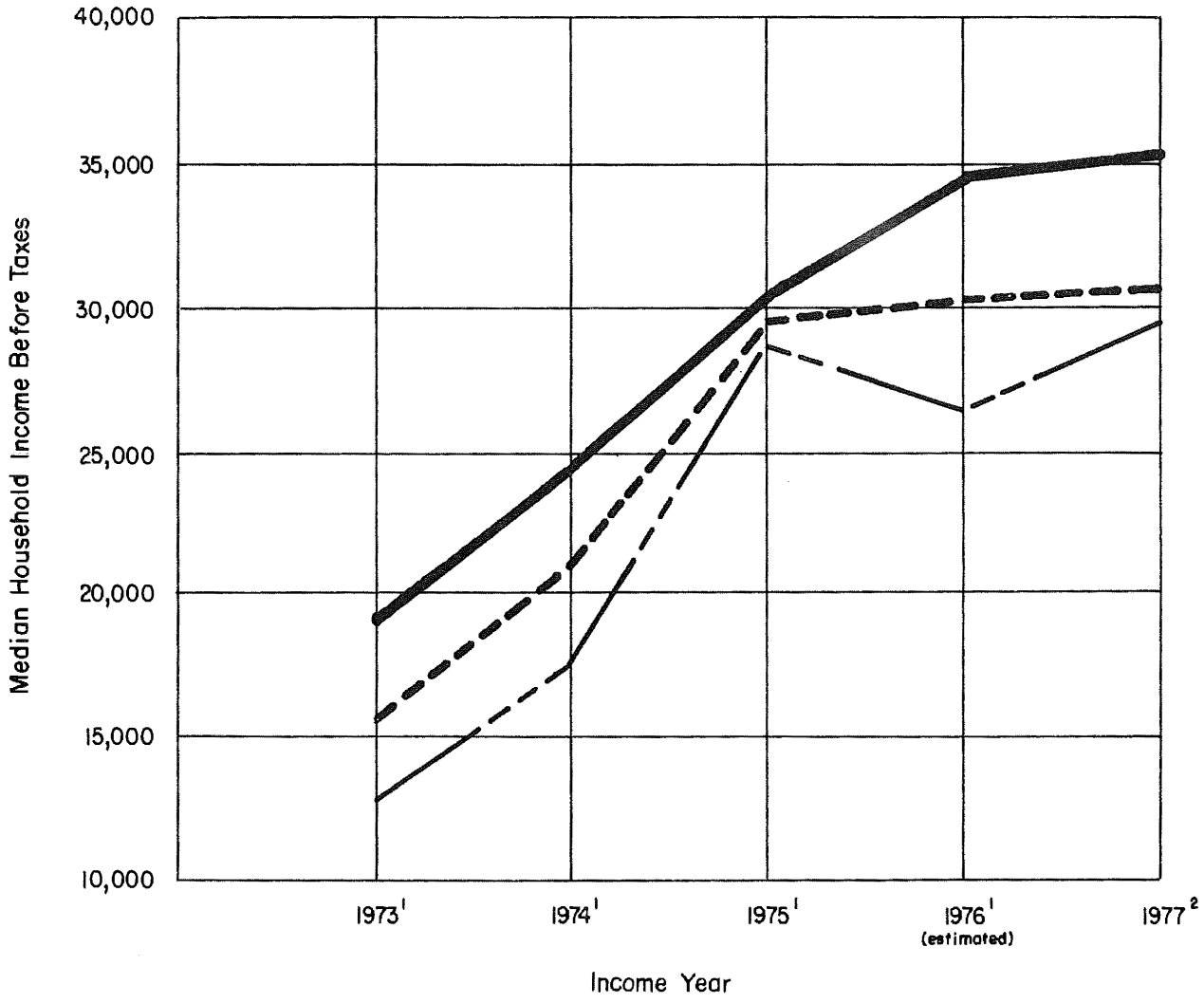
	All Adults	Heads of Household	Wife
Ever work on pipeline?			
Yes	28	34	15
No	72	66	85
	100	100	100
Number of Respondents:	638	382	256
Did the completion of the pipeline effect you in any way?			
Yes	33	42	19
No	67	58	81
	100	100	100
Number of Respondents:	638	382	256
How did its completion effect your job?			
Business decreased	28	31	29
Fewer jobs	29	15	25
Job ended	9	3	8
Cut in hours	6	8	6
Less pressure	3	10	5
Less pay	5	2	4
Outsiders competing for jobs	4	3	3
Business increased	4	3	3
Negative general mention	2	2	2
Positive general mention	2	-	1
Other	8	23	14
	100	100	100
Number of Respondents:	172	61	233

comparable figures for heads of household are 34 and 42 percent, respectively. Over a quarter of those who said their job was affected mentioned a decline in business as the major reason. Clearly it is not only those who worked for a pipeline company who currently are experiencing the effects of pipeline completion. Apparently the completion of the pipeline was the cause for increased business for a few; among them: a mover, an employment agency worker and a law enforcement officer.

Our 1976 survey results documented a rapid increase in household incomes. This information is combined with data from the current survey in Figure 7-1. The rate of increase in household incomes is seen to be leveling off, but still rising through 1977 for residents arriving before

FIGURE 7-1

MEDIAN HOUSEHOLD INCOME FOR FAIRBANKS RESIDENTS 1973 to 1977



Legend:

Residents of Fairbanks arriving after December 1972

All current Fairbanks Residents

Residents of Fairbanks arriving before December 1972

[1]Based on 1976 survey.

[2]Based on 1978 survey.

January, 1973. The fortunes of our more recent residents are not behaving in the same way. Persons arriving during the pipeline period were more likely than longer term residents to work directly for a pipeline company. As a result, the average incomes of this group rose at a faster rate than the resident population. During 1976, however, many of these residents moved out of Fairbanks. The data suggest that recent residents with higher incomes were more likely to move out of Fairbanks than recent residents with lower incomes. Another factor, no doubt, is the fact that since recent residents were likely to be directly dependent on pipeline activity, their incomes were the first to be affected. It is important to note, however, that the incomes of those residents who compose the stable, long-term element of the Fairbanks population are not, as yet anyway, experiencing a decline. The detailed annual income breakdown for those residents who arrived in Fairbanks before January, 1973, is provided in Table 7-8.

TABLE 7-8

Income Changes Among Persons
Living in Fairbanks since December 1972
(percent distributions)

	1973	1974	1975	1976	1977
Under 3,000	2	-	1	3	4
3,000 - 4,999	4	3	1	1	1
5,000 - 7,999	9	5	2	6	3
8,000 - 11,999	12	8	7	7	8
12,000 - 14,999	9	9	7	7	6
15,000 - 19,999	19	12	6	4	6
20,000 - 24,999	13	14	11	7	11
25,000 - 29,999	15	16	14	9	5
30,000 - 39,999	9	17	20	19	15
40,000 - 49,999	5	7	12	15	21
50,000 - 59,999	2	7	12	12	11
60,000 - 69,999	1	1	4	5	5
70,000+	-	1	3	5	4
	100	100	100	100	100
Median =	15,947	19,821	30,366	34,889	35,143

Turning now from household revenues to household expenditures, we can see in Table 7-9 that the demand per household for housing, land, furniture and appliances is about the same today as in 1976. One must remember, however, that we have experienced a substantial (but unknown) population decline. Anticipated expenditures are best viewed in comparison between 1976 and 1978 rather than as absolute measures of demand, particularly for items not subject to well-thought-out purchase plans.

TABLE 7-9

Household Expenditures
1976 and 1978
(percent of total households)

	Pattern of Purchases Over Last 12 Months		Anticipated Pattern of Purchases Over Next 12 Months	
	1976	1978	1976	1978
House	10	13	12	15
Mobile home	4	4	2	1
Other housing-related items (service hookups, bldg mat.)	5	4	9	8
Car	31	22	9	14
Truck	9	11	3	3
Recreation vehicle	4	2	1	1
Other transportation vehicles (motorcycles, airplanes, snowmachines)	8	8	3	3
Vacation	17	14	5	5
Moving, Commercial, Medical	3	1	1	-
Land	10	11	10	11
Furniture	7	10	3	4
Appliances, Equipment	23	22	6	1
No major purchases	25	28	48	45
Number of Respondents:	408	429	408	429

The next twelve months continue to look good for the real estate market, both in housing and in land. The appliance market, in contrast, does not appear particularly sound, although impulse buying can be a significant factor. Auto purchases fell considerably between 1976 and 1978 but appear to be on the upswing. In summary, consumer expenditures have not declined a great deal on a per capita basis and should remain at or near their current levels, unless households are basing their purchase plans on anticipated income which does not materialize. The fate of Fairbanks businesses, however, will only in part depend on per capita spending.

Some sectors of our economy may have over-expanded to meet peak population demands. Further net losses in population are not unlikely and this will put added pressure on some businesses. In addition, the loss of Alyeska local expenditures cannot be ignored. Providing businesses are not tied into high fixed costs and can gear down operations, there does appear to be a sound, but much smaller, economic base in Fairbanks.

One of the hardest, yet most important, economic indicators to construct is a good estimate of the population. The two waves of survey data are not designed to yield population figures but they can provide information on several dimensions related to population change. This information is summarized in Table 7-10. A dramatic decline in the rate of immigration is evident. At the same time, there has been a decrease in the proportion of residents planning to move from Fairbanks. In sum, it appears that most of the decline in population expected to result from the completion of the pipeline has already occurred. We noted earlier, however, that a second wave of out migration might occur if the number of active jobseekers increases substantially this summer.

The reasons given for leaving Fairbanks are shifting; job transfers, a dislike of change and a return to a usual place of residence are becoming less important reasons while retirement and personal reasons are relatively more important. The weather and high cost of living appear to be retaining their importance as reasons for leaving the Fairbanks area. Roughly, a quarter of those planning to leave Fairbanks expect to move to Anchorage. Another quarter plan to move elsewhere in Alaska and half expect to move outside Alaska.

Many other residents plan to move within Fairbanks (see Table 7-11). In fact, the proportion planning to move in the next two years is about the same as it was in 1976. Housing tastes do not appear to have changed significantly and the dispersion of the Fairbanks population outside the urban area looks as if it will continue. Results reported in Table 7-11 also show that Fairbanks residents are generally more satisfied with their residences now than in 1976. This trend is likely to be the result both of moves to better housing as well as out migration. The 1976 survey found that those least satisfied with their housing were short-term residents, most of whom have probably since moved from Fairbanks. The final section of Table 7-11 documents a decline in the average number of persons occupying a single household. Note that the shift is away from households with five or more persons and is probably indicative of the doubling up which occurred in the tight housing situation during the construction of the pipeline. A final indicator of housing conditions addressed in the survey is that of housing costs (see Table 7-12). This chapter concludes with two tables comparing age and education levels in 1976 and 1978 and a list of concerns our respondents would like the Borough to know about.

TABLE 7-10

Indication of Population Change
(percent distributions)

	1976	1978
A. Length of Residence		
1 year or less	18	8
1.1 - 2 years	20	5
2.1 - 3 years	6	13
3.1 - 4 years	3	9
4.1 - 10 years	20	28
10.1 - 20 years	16	18
Over 20 years	17	19
	100	100
Number of Respondents:	408	436
B. Plans to Move from Fairbanks		
Within next 6 months	13	4
Within next 2 years	13	7
Sometime in the future	20	19
No plans to move	54	70
	100	100
Number of Respondents:	405	429
C. Reasons for Moving from Fairbanks		
Job transfer or opportunity	18	11
Weather	13	14
Dissatisfaction with change	9	3
Return to other place considered home	8	5
General dislike of Fairbanks	8	6
Retirement	6	11
Like different geographical setting	6	6
Find cheaper place to live	6	5
Personal reasons	5	13
Lack work	4	4
Other	17	22
	100	100
Number of Respondents:	405	429

TABLE 7-11

Housing Trends in Fairbanks
(percent distributions)

	1976[1]	1978
Plans to move within Fairbanks		
Within next 6 months	18	18
Within next 2 years	10	12
Sometime in the future	13	15
No plans to move	59	55
	100	100
Number of Respondents:	408	434
Type of house plan to move to		
House in rural subdivision	38	34
House in isolated rural area	36	38
Condominium or apartment	11	13
House in town	15	15
	100	100
Number of Respondents:	166	183
Change in housing satisfaction		
Delighted	22	15
Pleased	14	32
Mostly satisfied	15	25
Mixed	28	12
Mostly dissatisfied	9	7
Unhappy	4	6
Terrible	8	3
	100	100
Average satisfaction level:	4.7	5.1
Number of Respondents:	408	435
Number of persons per household		
1	17	17
2	28	36
3	20	20
4	16	16
5	10	6
6	7	4
7 or more	2	1
	100	100
Average number of persons per household:	3.02	2.70
Number of households:	408	428

[1]Results from 1976 survey.

TABLE 7-12

Housing Costs in Fairbanks
(percent distributions)

1977 Housing Costs including housing payments, heat, water, and electricity for most expensive month	Percent
Under $200	10
200 - 299	8
300 - 399	17
400 - 499	16
500 - 599	15
600 - 699	10
700 - 799	8
800 - 899	7
900 - 999	2
1,000 - 1,499	6
1,500 and over	1
	100

Average total housing cost (mean) for most expensive month	$507
Median total housing cost for most expensive month	$482

TABLE 7-13

Age and Education Comparisons
1976 versus 1978
(percent distributions)

Age	1976 M	1978 M	1976 F	1978 F	1976 T	1978 T
1 - 4	8	8	8	8	8	8
5 - 11	11	10	13	10	12	10
12 - 17	11	10	12	11	12	10
18 - 29	28	28	27	31	27	29
30 - 39	17	21	17	18	17	19
40 - 49	12	10	11	11	11	11
50 - 59	10	8	8	7	9	8
60 - 69	2	4	3	3	3	4
over 70	1	1	1	1	1	1
	100	100	100	100	100	100
No. of Respondents:	648	576	1224	616	539	1156

Years of Education	Head of Household 1976	Head of Household 1978	Wife 1976	Wife 1978
1 - 6	2	1	2	1
7 - 11	13	14	14	12
12	30	33	37	39
13 - 15	25	27	30	26
16 or more	30	25	17	22
	100	100	100	100
Ave. years of education (mean):	13.3	13.2	12.8	13.2
Number of Respondents:	398	410	303	294

TABLE 7-14

Borough Concerns[1]

		Percent[2]
1.	Too few services or poor services	14
2.	Bad roads	9
3.	Need better fire protection; can't get fire insurance	9
4.	Need better controls on growth	7
5.	Too many Borough regulations	4
6.	Taxes too high	4
7.	Need more recreation facilities	4
8.	Concerned with quality of education	4
9.	Poor bus service	3
10.	Cost of living too high	3
11.	Ice fog, pollution problems	3
12.	Want Alaskans hired before outsiders	2
13.	Fairbanks is growing too fast	2
14.	Concern with crime	1
15.	Need to clean up	1
16.	Want more study of petrochemical development	1
17.	Percentage mentioning other concerns	20

Number of Respondents: 428

[1]The question read, "Do you have any concerns you would like the Borough to know about?"

[2]Figures reflect percentage of total sample mentioning each specific concern.

Appendix A

RESEARCH METHODS

The research methods employed were chosen with one primary objective in mind; this objective was to construct a sample of persons which accurately represents the entire resident population of the Fairbanks North Star Borough. It is not possible to develop such a sample on the basis of available lists such as voter registrations, telephone numbers, tax roles or city directories. Each have their own deficiencies. It is certainly not possible to achieve a truly representative sample without a complete enumeration of the population to be sampled, hence a population list (sample frame) had to be developed. The same sampling objective applied to the 1976 ISER survey. At that time, approximately five man-months of effort were expended to construct a good sample frame for the North Star Borough. Some 15,000 households were located geographically in close to 2,000 sample segments which together covered the entire surface area of the Borough. This sample frame was updated in January and February of this year.

Once all the households in the Borough were located within clear geographic boundaries, a sample of 75 blocks were drawn with probabilities according to size. All households within the sample blocks were then uniquely described and mapped (listed) and a sample of households drawn. The combination of block and household selection probabilities equals a known, and equal, probability of selection for every household in the North Star Borough. In other words, each household in the Fairbanks North Star Borough had an equal chance of being selected in the survey. All sample selection decisions were dictated by theoretical sampling requirements and were not subject to the discretion of the project director, interviewing supervisor or of the interviewers themselves. The same sampling technique is employed by the National Opinion Research Center of the University of Chicago, the Survey Research Center of the University of Michigan and the U.S. Census Bureau.

Several elements of the total Fairbanks population were deliberately excluded from the sample frame. These were: on-base military and dependents, persons living in institutions such as the correction facility, hospital, and university dormitories and transients defined as people either without a Fairbanks residents or who are staying in motels or hotels in which more than 50 percent of the room are paid for on a nightly basis. All other households, regardless of type, condition or location were included in the sample frame. Thus, sample locations included were as disparate as Salcha and the Northward Building.

The person actually selected within a sampled household was predetermined as well. Half of the designated respondents were husbands and half wives. In households where no resident fit the designated role, the head of household was interviewed. The husband-wife/head selection

procedure does result in a small segment of the adult population being excluded (approximately 3 percent of all adults who are not children of the head of household) but it is not a large enough number of persons to warrant the use of a more complicated respondent selection procedure.

A sampled household and designated respondent were fixed; no other household or respondent could be substituted. Consequently, interviewers had to repeatedly return to sampled households if no one was home or even if only the designated respondent was absent. All non-completed interviews had to be accounted for. Table A-1 provides a summary of the sampling information.

The 436 households in the survey represent a sample of approximately 3 out of every 100 households in the North Star Borough. It is important to understand that the reliability of survey results is not primarily dependent on the percentage of the population that is sampled. Statements are often made to the contrary but they are absolutely incorrect unless the sampling rate is substantially above 40 percent of the population. Reliability is a function of the absolute size of the sample and the manner in which the sample is constructed. In the case of this survey, the reliability of the results could only be improved if the sample were greater than 436 interviews or if each household was selected independently at random (that is, without first selecting small clusters of houses). Adopting either of these approaches would, of course, have increased the cost of the survey.

The individual results from questions in the survey differ somewhat in their reliability. This is because:

1. some questions receive many different responses and are more difficult to pin down.
2. some question response categories receive about half (50 percent) of all responses and are subject to more variation than a response pattern split in a different way (for example, 20 percent in one category and 80 percent in another).
3. some questions or comparisons between questions involve fewer numbers of interviews than others. In general, a larger number of interviews will provide a more reliable result.

While differences in reliability may appear confusing, it is mentioned here for an important reason. Armed with the above guidelines the reader can interpret for himself the reliability of individual results. In most cases the number of respondents on which each result is based is provided. Where the number of respondents is not indicated, the reader may assume that the full sample of over 400 interviews applies. Each reported percentage can be best used to define a range within which the true value of the population can be found in 95 out of 100 attempts. The range for percentages involving the full sample can be roughly defined by adding and subtracting 6 percent to the reported percentage.

TABLE A-1

Sampling Information

A.	Total number of selected households	716	
	Number of improper listings	36	
B.	Adjusted number of selected households	680	
	Number of vacant households	97	
	VACANCY RATE	14%	
C.	Number of households upon which response categories are computed	583	
	1. Number of completed interviews	436	75%
	2. Number of households where no contact was made after 5 or more attempts	33	6%
	3. Number of households which refused to participate	58	10%
	4. Number of households in which no interview was conducted for other reasons	56	9%
		583	100%

For example, a 30 percent response in one category means that the true value lies between 24 and 36 percent. The reported 30 percent remains our best estimate.

In addition to employing the sampling procedures described above, a number of other important controls were applied to insure that the results are not biased and reliably reflect the views of Fairbanks residents. The questions asked and information presented during the interview were reviewed by representatives of diverse interest groups and were pretested in the Fairbanks area to make sure they reflected a balanced point of view and were not confusing. A total of 30 out of 90 applicants for the position of interviewer were hired and trained in interviewing methods and drilled on the specific survey questions so that each interviewer would ask exactly the same questions in exactly the same order. Persons selected as interviewers varied widely in age, sex, background and length of residence. In addition, interviewers were instructed to record everything the respondent said and never inject any of their own ideas during the course of the interview.

Ten percent of the completed interviews were verified by telephone and ten percent of the coded interviews were checked to insure that field and coding instructions were accurately followed. All information identifying individual respondents and households was excluded from the data

entered on the computer and removed from the questionnaire itself to insure that the confidentiality of all respondents is safeguarded.

The survey data now reside on tape at the University of Alaska, Fairbanks, and are available for public use under the direction of Dr. John Kruse at the Institute of Social and Economic Research.