Prepared for

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Stranded Gas Development Act Municipal Impact Analysis

For the application by BP Exploration (Alaska) Inc., ConocoPhillips Alaska, Inc., and ExxonMobil Alaska Production, Inc.

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(CORRECTED)

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Stranded Gas Development Act
Municipal Impact Analysis

Producer Group's Application

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PURPOSE OF THE STUDY

When the Alaska Legislature enacted legislation to promote construction of a pipeline to transport North Slope natural gas, it did so fully mindful of the variety of impacts brought about by Alaska's last construction mega project. The Trans Alaska Pipeline System (TAPS) project, an 800-mile oil pipeline running from Prudhoe Bay to the Port of Valdez, was launched with vastly inadequate planning on how to deal with the social and economic impacts it would bring to both the directly affected communities of Alaska, and to the state as a whole.

The frenzied mix of highly paid jobs and the in-migration of tens of thousands of workers to Alaska during the construction phase dramatically drove up housing costs, wages, and the cost of living. Furthermore, crime rates soared, as did demands on virtually all social services. The logistical operations of moving construction materials to pipeline construction sites severely strained the existing transportation routes of highways and the railroad. The socio-economic impacts of construction lasted long after the project was completed in 1977, and some impacts persist as of 2004.

In crafting the Alaska Stranded Gas Development Act (SGDA), the political vehicle that could set Alaska's role in speeding construction of a gas pipeline, the Legislature included a provision to establish a Municipal Advisory Group. The Legislature's charge to this group is to advise the state Commissioner of Revenue on economic and revenue impacts to municipalities under the specific construction scenarios submitted by applicants seeking to build the gas pipeline.

The Department of Revenue contracted with Information Insights, Inc., to prepare a socio-economic impact study on the municipalities and the portion of the unorganized borough areas affected by construction and operation of the gas pipeline. Information Insights also assisted the Municipal Advisory Group in making recommendations to the Department of Revenue regarding SGDA contract terms.

This study focuses on the impacts from construction and operation of a gas pipeline project as proposed by a Sponsor Group consisting of the Alaska North Slope producers. The Sponsor Group proposes a 52-inch gas pipeline that would run from Prudhoe Bay through Fairbanks and across the Canadian border, continuing to the established Canadian natural gas market hub in Alberta. Construction of the gas pipeline, gas treatment plant (GTP), natural gas liquids extraction facilities[1], and compression stations along the line will cost an estimated $21.5 billion[2]. The Alaska portion, including all pre-construction and construction costs associated with the gas treatment plant, the pipeline

[1] The Sponsor Group proposal shows the natural gas liquids extraction facilities being located outside Alaska.

[2] All costs in this report are converted to 2004 dollars. The Sponsor Group application expresses costs in 2001 dollars.

and the compression stations, would cost roughly $6.9 billion. Of this $6.9 billion, the gas pipeline and compressor station construction would cost approximately $4.3 billion, with the GTP costing slightly more than $2.6 billion.

Current gas production on the North Slope is about 8 billion cubic feet (Bcf) of gas per day, with most gas being re-injected into the existing oil reservoirs and/or used for fuel in the ongoing production leases. As owners in both the Prudhoe Bay and Point Thompson gas resources, the Sponsor Group possesses a working interest in roughly 32 trillion cubic feet (Tcf) of North Slope natural gas. In order to qualify for a SGDA contract, under AS 43.82.100(2), the project must produce at least 500 Bcf of stranded gas within twenty years from the commencement of commercial operations. In the *Amended Application for Development of a Contract Under AS 43.82: The Stranded Gas Development Act*, the Sponsor Group states the following:

> Assuming sufficient natural gas supplies are developed to fill the approximately 4 Bcf design capacity for thirty-five years, approximately 50 Tcf of stranded gas would be delivered to the market by the pipeline project.

Based on this and other statements, plausible assumptions could estimate an operational life in a range of 25 to 35 years. A more conservative assessment of this project could place the estimated operational life at the end of contract terms negotiated between the State and the Sponsor Group. At a design capacity of 4.5 Bcf per day, a pipeline could deliver roughly 32.8 Tcf of gas over twenty years of operation. It is reasonable to conclude that the operational lifetime of this project, including pipeline and gas treatment plant, is a function of the following factors:

- Ongoing investment into maintenance and design upgrades with the pipeline and pipeline facilities
- The increasing volume of technically recoverable natural gas reserves located on the North Slope that can be brought to market in an economically-viable manner
- As an open-access pipeline, the investment in the delivery laterals used to serve any of the intrastate Alaska gas markets in the foreseeable future

This study examines the following impacts on municipalities:

- **Socio-economic impacts** – the effects on local governments of all pre-construction, construction, and operations and maintenance costs pertaining to the pipeline, the compressor stations, and the gas treatment plant
- **Revenue impacts** – the revenue changes for municipalities from gas pipeline construction and operation, or from SGDA contract provisions
- **Subsistence and socio-cultural impacts** – the effects of pipeline construction and operation on access to, competition for, or quality of subsistence resources
- **Cumulative impacts** – the aggregate effects on both subsistence and socio-cultural issues in Alaska from the prolonged existence of oil and gas development projects and facilities

The study is not an environmental impact statement (EIS). It focuses only on this Sponsor Group application, and does not address impacts from potential in-state use of gas resources. We focus on municipal impacts, but have attempted to bring to light many

issues that will need to be considered in depth when an EIS is prepared for either the Sponsor Group project or any other gas pipeline project that might progress. The amount of time and resources available to this study constitute only a fraction of those required to conduct a full analysis of all impacts.

SOCIO-ECONOMIC IMPACTS

Analysis of the economic impacts to municipalities primarily relies on an economic model built by Information Insights. Integral components of the model were identified by an initial analysis of the municipal economic impacts experienced during TAPS, with adjustments for scale and region. Adjusted to current dollars, TAPS not only cost 3.5 times the amount projected for the Alaska portion of the proposed gas pipeline, TAPS also cost more than the estimate for the entire proposed gas pipeline project. Alaska's population has doubled since TAPS construction started, and its economy is far more diverse and robust. For these reasons, the relative impact of the gas pipeline on Alaska can be expected to be far smaller in aggregate. Nonetheless, there will be impacts on Alaska communities and municipal governments.

This study estimates impacts of gas pipeline construction on municipal and village governments, including those state government costs that would need to be covered by local governments absent the state spending. Drawing upon the lessons of TAPS construction, and both public data provided in the application and confidential data from the Sponsor Group, the report addresses impacts in these categories:

- **Labor force impacts.** How much labor will be required to build the gas pipeline and to support its construction? How much of that labor can be provided from the existing Alaska workforce, how much can be provided by training or re-training the Alaska workforce, and how much labor will need to be imported? *This study estimates an increase of 9,300 jobs per year on average during the construction period. In order to maximize opportunities for local hire, and to reduce impacts of population growth due to immigration, workforce development efforts in Alaska communities will require an estimated $6.6 million in new costs over the four years prior to and at the beginning of the project to meet gas pipeline construction needs.*
- **Population impacts**. How is the population of Alaska likely to change during and after gas pipeline construction, both statewide and regionally? How much of that change is attributable to the gas pipeline project? What costs for municipal services will be required to meet the population changes? *This study estimates Alaska population will increase by 9,400 – 10,400 during the entire period of pipeline construction, adding $38.1 million in population-induced costs to municipalities over the construction period.*
- **Infrastructure impacts**. What new infrastructure – roads, highways, railroad, ports, airports and utilities – will be required to be provided by governmental entities prior to commencement of construction? What new traffic loads will be created during construction and how will they affect the infrastructure and other users? What will be the impact on maintenance of infrastructure during

construction? How much deterioration of infrastructure can be expected during the construction process? *This study estimates $19.1 million in economic impacts to municipalities and villages for infrastructure during gas pipeline construction. In addition to this municipal impact, $284 million in new state highway and port projects will be required in advance of gas pipeline construction. Absent new funding for these projects, if federal highway aid is used to support the pipeline-related transportation infrastructure, existing projects on the State Transportation Improvement Plan (STIP) will be delayed up to a year to accommodate these projects. Additional infrastructure repair costs are likely to be required after construction is completed.*

- **Law enforcement and emergency services impacts.** How will population changes impact crime rates and law enforcement in Alaska municipalities and villages? What changes in fire protection, ambulance and medical evacuation may be required to address gas pipeline construction impacts? *This study estimates $25.9 million in municipal law enforcement and emergency services impacts during gas pipeline construction, including $5.8 million in new state trooper coverage.*
- **Health and human services impacts.** How will the project impact the Alaska health care system, including municipal hospitals and village health clinics? What changes in social service demands will impact local communities? Most health and human services in Alaska are provided by state and tribal programs, and not by municipalities. *This study estimates $4.9 million in municipal health and human services impacts during gas pipeline construction. Additional health and human service impacts will need to be addressed after construction is completed.*
- **Education impacts.** How many new children will enter Alaska schools as workers and their families move into the state to fill needed jobs or to search for jobs? Which communities will see changes, and will the magnitude require construction of new schools in any communities? *This study estimates $3.4 million in local support for K-12 education will be required during gas pipeline construction. In addition, the State of Alaska will also see an increase of $15.1 million in the public school foundation formula from the increase in K-12 students.*
- **Wage impacts.** How will the project affect wages generally, and in particular, how will wage impacts affect municipal and village governments? What changes in municipal administration and support will be required? *This study estimates wage impacts for municipal operations of $11.2 million during the pipeline construction period. Municipal capital spending during pipeline construction will also be affected, but is not included in this analysis.*
- **Subsistence and socio-cultural impacts.** How will the project affect abundance of subsistence resources, access to subsistence resources, and quality of subsistence resources? What will be the changes in fish and wildlife population dynamics? How will changing local economies affect the subsistence economy? What planning, research and remediation will be required? *Estimating financial costs for subsistence and cultural impacts means applying quantitative methods to primarily qualitative circumstances. This study takes the approach of estimating*

costs for planning, monitoring and evaluating subsistence impacts, with mitigation of certain impacts during construction, at $11.5 million. The costs and restitution required for catastrophic impacts have not been calculated but will need to be addressed in an EIS process.

- **Cumulative impacts.** The presence of a gas delivery system will bring new exploration and development of gas resources in the vicinity of the project. What will be the cumulative impacts of gas commercialization on the North Slope? How will new activity cumulatively affect the subsistence resources and economy of the North Slope? *A comprehensive treatment of this complex issue is far beyond the scope of this study, but cumulative impacts cannot be ignored at the commencement of this project. This study identifies some of the major issues, but as with construction impacts on subsistence, does not address costs or restitution for most cumulative impacts. It does estimate costs of an ongoing subsistence monitoring and evaluation process, adopting an endowment approach at a cost of $5 million.*

Economic impacts to local governments are generally expressed in this report as statewide aggregates due to the difficulty of discussing impacts on the municipal level without disclosing confidential information on projected manpower needs, transportation plans, the location of camps and facilities, and the timing of gas construction activities.

This study estimates total economic impacts to local governments during pipeline planning and construction (FY2007–FY2014) at approximately $120 million. It estimates oil and gas production property taxes related to the gas project due under AS 43.56, absent a SGDA contract, would be approximately $258 million. The economic impacts, however, come early in the process, while the property taxes that offset those impacts would come much later, including nearly 45 percent at the very end of the period. We estimate that municipal governments would receive $10.7 million in net additional property taxes due to new construction and increased economic activity during the construction period.

The economic impact model incorporates an understanding that Alaska has the capacity to absorb significantly more construction-related impacts than during TAPS because of the greater breadth and sophistication of the state's economy today. Further, the model relies on the assumption that the Sponsor Group and the state of Alaska will prioritize two key elements:

- High-skills job training for Alaska workers to maximize the opportunities for Alaskans.
- Media campaigns by the state, the Sponsor Group and major sub-contractors advising residents of other states that gas pipeline construction will rely predominantly on skilled Alaskan workers…ultimately discouraging speculative migration to Alaska for non-specific pipeline jobs.

The seasonality of the Sponsor Group's proposed construction schedule overlaps well with the seasonality of the existing construction workforce in Alaska. With appropriate planning and workforce development, we estimate that direct and indirect employment on the project by the Sponsor Group and its contractors could reach a resident hire rate in

excess of 50 percent, reducing negative impacts to Alaska's local governments and maximizing positive impacts to Alaska's economy and for its residents.

REVENUE IMPACTS

The SGDA allows the Commissioner of Revenue to negotiate fixed payments in lieu of taxes (PILT) for one or more taxes that otherwise would be imposed by the state or a municipality on a natural gas pipeline developer. Once the state approves an SGDA application and proposed project plan, the Commissioner of Revenue may propose terms for inclusion of a PILT in a contract between the state and the qualified sponsor or sponsor group. Under the SGDA, essentially all taxing authority a municipality may have had on a natural gas pipeline project was removed in favor of a state-negotiated PILT for any municipal taxes.

The study examines the effects of including various municipal taxes in the SGDA contract, concluding that only AS 43.56, the Oil and Gas Production Property Tax, has the potential to provide any real benefits to the project without overriding costs. This tax:

- As currently structured, is the only one that could potentially be significant to the economics of a gas pipeline project;
- Does not involve administrative or logistical challenges exceeding the benefits that might accrue from an exemption for pipeline sponsors from the tax; and
- Provides an opportunity for benefits to accrue to both pipeline sponsors via deferred tax liability and the municipal governments via revenue stream certainty.

The Municipal Advisory Group members determined there were numerous potential benefits of a PILT for oil and gas property taxes to a successful applicant under the SGDA. A PILT could provide certainty for the life of the contract. If the PILT structure is not based on cost, as property taxes are, it would not exacerbate cost overrun risks of the project by increasing taxes as well as costs. This in effect shifts some of the cost containment risk from the pipeline builders to local governments, an issue of some concern to some Municipal Advisory Group members. The Municipal Advisory Group consideration of a potential PILT was based on the understanding that PILT payments would be made directly by the Sponsor Group to municipalities, as is the case with current tax payments, and that the PILT would be considered outside existing tax caps, as is the case with other current payments in lieu of taxes.

A PILT could also potentially benefit a successful applicant by leveling the curve – by not starting revenue PILT payments until operation of the gas pipeline commences – thus avoiding the perceived "front-end loading" of the property tax structure.

After considering the benefits to an applicant, the Municipal Advisory Group members determined that replacement of all other forms of taxation would be highly complex to equitably replace and would have insignificant impacts. The group by resolution decided upon the parameters of a PILT structure that could meet municipal objectives. The group agreed upon the following requirements for payment in lieu of AS 43.56 taxes under the following conditions:

- The estimated net present value of PILT payments is equivalent to the estimated net present value of property taxes that would otherwise be paid without a SGDA contract, ensuring equal net present value over the contract period; and
- The value of PILT payments is based on the current 20-mill state tax, leaving opportunities for municipalities on the pipeline corridor (or having gas pipeline personal property within their boundaries) to change property tax rates based on changing conditions in their municipal boundaries, and allowing opportunities for new municipalities to form in the unorganized borough portions of the pipeline corridor; and
- The PILT payments are paid directly by the gas pipeline sponsors to municipalities, as are municipal property taxes, based on an allocation plan (yet to be determined) that recognizes changing conditions.

Assuming that a PILT would be negotiated that would replace the existing AS 43.56 tax structure, the following resulting impacts are detailed in this report:

Impact on valuation and state funding formulas for education. If properties associated with the construction of a natural gas pipeline are removed from the existing tax structure, the question remains as to how the valuation of those properties, separate from taxation, is handled. Current practice is that property values that are mandated to be exempt from taxation are not included in the full and true value determination. Properties that are locally, or optionally exempt are included in the full and true value.

Full and true value plays a significant role in determining funding levels for state aid to education. The education foundation formula calculates "basic need" for education by school district, and is a function of student enrollment, school size, a state-approved cost factor, special education needs, and the number of correspondence students. Once basic need is determined, it is reduced by the required local contribution, which is in some cases based upon full and true value.

The majority of municipalities determine their local contribution based on the four-mill equivalent on local full value of current property. A new project like the gas pipeline increases the education funding requirement by only half the added value (effectively two mills on new property). A few municipalities use the alternate funding based on a percentage of basic need. These few municipalities have an upper limit for local funding based on an additional percentage of basic need or two mills equivalent on full and true value.

Impact of state restrictions on municipal taxation. The Municipal Advisory Group had lengthy discussions on both the negative and positive effects of the current municipal tax structure. The Municipal Advisory Group generally supports preservation of the tax structure, as it currently exists under Title 29. The current law limits property tax revenues for operations as follows:

- A property tax for any purpose in excess of three percent of the assessed value of property in a municipality may not be levied;
- A municipality may not levy taxes that will result in its total property tax revenue exceeding $1,500 per capita for its residents. Furthermore, the total assessed

> valuation of taxable property in the municipality may not exceed the product of 225 percent of the average per capita assessed full and true value of property in the state, multiplied by the number of residents in the municipality.

There is consensus by the Municipal Advisory Group that the 20-mill limit on oil and gas properties under AS 43.56 provides flexibility for changing circumstances in municipal government. The group also concurs on the need for a reasonable and transparent method for valuing a gas pipeline and determining a PILT. Impacts of an SGDA contract on state restrictions on municipal taxation, if any, must be clear prior to Municipal Advisory Group support of the contract terms.

Impact on unorganized boroughs and boroughs in process. The Municipal Advisory Group recognizes the importance of ensuring a solid tax base in the event that future governments form in the unorganized borough, or that current governments change their form. The Municipal Advisory Group asked that the state ensure the PILT structure so as to recognize the loss to present and future forms of local government regarding the opportunity to respond to changing conditions through changing tax rates.

Impact on local tax caps. Six municipalities that are part of the Municipal Advisory Group have some type of revenue or tax cap that must be acknowledged when considering tax or payment in lieu of tax structures for a gas pipeline project. Under the existing tax structure, revenue-impacted communities could anticipate long-term revenues from the project once it is operational. Economically impacted communities are likely to experience social or economic impacts during construction of the project. With the proposed gas pipeline project, two municipalities will have the largest revenue impact – the North Slope Borough and Fairbanks North Star Borough. Municipality of Anchorage or Kenai Peninsula Borough revenue impacts during construction could approach those of the Fairbanks North Star Borough, if module construction occurs at either port.

SUBSISTENCE AND SOCIO-CULTURAL IMPACTS

This report cites likely impacts of gas pipeline construction and operation on subsistence resources and places them within a context of socio-cultural impacts. Studies of harvest data and confidential assessments by gas pipeline developers or other entities do not tell the story alone.

A comprehensive assessment of predicted impacts must include first-hand experiences of people who understand and have participated in the cycles of life in rural Alaska. Adequate testimony and interviews during the EIS process, combined with analysis of data, such as harvest reports, may begin to overcome the shortcomings of previous EIS activities.

There are four principal categories of direct subsistence impact:

Availability of resources: Changes in the abundance, displacement, contamination, or health of a resource.

Access to resources: New roads, industrial or residential development, and improved transportation and technology.

Competition for resources: Increased numbers of people with access to subsistence areas.

Realignment within rural communities of subsistence priorities and supportive technologies: Changes in time and space patterns of subsistence resource use. Some related subsistence concerns include:

- Optimizing employment of people from villages along the gas pipeline route with minimal disruption to the provision of traditional foods and cultural activities
- Development impact scenarios… understanding that greater economic activity in villages will improve some aspects of quality of life, but may negatively affect other conditions
- Climate change. The Arctic Council study to be released in November 2004 now joins a growing body of scientific work and traditional knowledge that clearly identifies that climate change is not only occurring, but accelerating and impacting northern indigenous peoples.
- Complex interactions between climate change, industrial activity, subsistence resources and subsistence activities.

Presentation of the expected impacts of proposed developments on North Slope, Northern Interior, and Upper Tanana communities is accompanied by discussion of potential mitigation of these expected impacts. The issues and costs (social, environmental and monetary) of mitigating impacts, including catastrophic events, should receive major focus in EIS reports.

CUMULATIVE IMPACTS

Along the proposed gas pipeline corridor, many regions will experience significant impacts during and after construction of a gas pipeline. Impacts can take on lives of their own, and this is particularly true on Alaska's North Slope. Each development project on the North Slope has included predictions of relevant impacts in its EIS. State and federal agencies also have predicted impacts in their comments and their permitting of new developments. With the wisdom of looking back on historical development activities, in some circumstances, impacts are not simply additive: one plus one may equal more than two. The accumulation of impacts from North Slope oil and gas development over the past 30 years has resulted in impact density of considerably greater magnitude than when each EIS was considered individually.

In the North Slope Borough, exploration for and development of new natural gas reserves will create impacts that will accumulate both over time and across a vast area. New developments are likely to have even more impact on subsistence and culture of the North Slope than the more time and area limited activities resulting from gas pipeline construction. The cumulative impacts that occur following construction and operation of the gas pipeline system will be most pronounced on the North Slope. The North Slope Borough has played a central role in addressing this difficult issue, including assisting the National Research Council in preparing its report on cumulative environmental effects that is cited in the body of this report.

Cumulative impacts of oil and gas activities on the North Slope to date have been visual, economic, environmental, and cultural. As the development infrastructure increased, individual enclaves gradually evolved into an industrial community connected by a transportation system. When the complete EIS for the gas pipeline project is prepared, a comparison of prior predicted versus actual events – particularly in respect to predictions of subsistence and socio-cultural impacts – should help inform decision-making about this project.

Expansion of field development has to be considered as a direct extension of permitting the pipeline – *upstream* development is a critical component of assessing the true impacts on the North Slope Borough. The term *spaghetti effect* describes the cumulative upstream industrial sprawl that is of particular concern in the North Slope Borough.

As industry expands westward toward the Colville River delta and into NPR-A, more roads and industrial developments spot the landscape, creating islands of land surrounded by industrial activity. These areas may have been used for subsistence harvest but have become inaccessible even though they are not technically part of any project. As the infrastructure that accompanies exploration and extraction of natural resources continues to expand, the amount of land available for subsistence use decreases.

In addition to industrial activity, the North Slope has seen greater non-resident hunter activity resulting from increased accessibility via the Dalton Highway. Reducing the supply of land available for subsistence activities and increasing access to previously remote land has the additional unintended effect of altering the way in which people think about land. These factors may cause an emphasis on enforcing property borders, even though this has not been a traditional land use pattern in most Alaska Native communities.

The concept of examining cumulative effects should include interaction between the impacts of former military activities, new gas pipeline activities, and subsistence resources and activities. In the Upper Tanana, military pipelines carried products northward from Whitehorse (CANOL) and Haines (Haines-Fairbanks pipeline). A suite of issues has emerged from those pipelines and should be integral to discussions with knowledgeable people in the region as part of the EIS process. In the Upper Tanana, as in other regions, there are additional on-going questions about hazardous waste liabilities remaining from past military activities; trespassing on Native allotments; rights-of-way; and gravel sales.

II. Introduction

ALASKA STRANDED GAS DEVELOPMENT ACT

The Alaska Legislature adopted the Alaska Stranded Gas Development Act (SGDA) in 1998 (HB393), and modified the Act with amendments passed in 2003 (HB16), to encourage a natural gas pipeline to bring North Slope natural gas to market[3] The legislation offers sponsors of gas pipeline projects the opportunity to negotiate contracts with the State of Alaska in order to reduce a project's financial risk by establishing negotiated royalty and tax payments.

The legislature found that while the state could do little to reduce expected construction costs, the state could reduce some financial risk associated with a stranded gas development project by adjusting the timing of when the state and local government receive their share of the economic rent of the project. It found that the present fiscal regime is front-end loaded, which means the state and local governments take a significant part of their share of the economic rent early in the life of the project, even before the project starts to generate a revenue stream. The state administration and legislature believed the state and local governments could improve the economics of a stranded gas development project by taking their shares of the economic rent of a project later in the life of a project.

The legislation allows the state administration, subject to legislative ratification, to negotiate with project sponsors for tax and royalty rates. These provisions supersede the affected municipalities' ability to collect property taxes from any stranded gas project that is developed within the parameters of the Act. Instead, the state will negotiate a payment in lieu of taxes (PILT) for the municipalities, presumably reducing or eliminating municipal taxes during the construction and ramp up of the project, and allowing for a revenue stream to municipalities when the project becomes profitable.

The purpose of this legislation is to assist in making a gas pipeline project in Alaska financially feasible, while also addressing the social and fiscal impacts of pipeline development on Alaska communities. Under the application process, a sponsor of an SGDA project is required to provide a "detailed description of options to mitigate the increased demand for public services and other negative effects caused by the project."

MUNICIPAL ADVISORY GROUP

In adopting the Stranded Gas Development Act, the state asserted that assistance to a stranded gas project is in the best economic interest of the state. The state recognized, however, that Alaska's municipalities would experience impacts from pipeline development. Although most municipalities affected by the development will likely benefit in the long

[3] Stranded gas is defined as natural gas located in a reserve with little or no access to market, so a substantial portion will not be produced within 25 years.

term, in the short term they will face increased demand for public services without increased tax revenue to pay for those services.

Under the SGDA, legislature ensured that the state would address municipal concerns by creating a Municipal Advisory Group, consisting of representatives of Alaska municipalities who may be "economically affected" or "revenue affected" from gas pipeline construction and operation. For purposes of the SGDA, a municipality is considered economically affected if it will be required to provide additional public services under the terms proposed in an application. A municipality is considered revenue-affected if it will be restricted from imposing a tax, or a portion of a tax, as a result of implementation of a gas pipeline construction contract.

In January 2004, the Alaska Commissioner of Revenue appointed a Municipal Advisory Group to advise the state about issues related to municipal impacts of the gas pipeline. The Municipal Advisory Group consists of representatives of the following communities:

Municipality	Revenue Affected	Economically Affected
North Slope Borough	Real property, oil and gas production property	Yes
Fairbanks North Star Borough	Real property, oil and gas production property	Yes
City of Fairbanks	Real property, oil and gas production property	Yes
City of North Pole	Real property, oil and gas production property, sales	Yes
City of Delta Junction	No	Yes
Municipality of Anchorage	Real property, personal property oil and gas production property	Yes
Kenai Peninsula Borough	Real property, oil and gas production property, sales	Yes
City of Kenai	Real property, oil and gas production property, sales	Yes
City of Seward	Oil and gas production property	Yes
City of Valdez	No	Potentially
City of Haines	No	Yes
City of Skagway	No	Potentially
Unorganized Borough – Interior (Represented by Tanana Chiefs Conference)	No	Yes

Table 1: List of revenue-impacted and economically impacted communities

The Department of Revenue contracted with Information Insights, Inc., to examine impacts on the municipalities and areas affected by construction and development of the gas pipeline. The Municipal Advisory Group met frequently during the winter, spring and summer of 2004, hearing a variety of presentations and discussing issues arising from the Stranded Gas Development Act and potential effects of gas pipeline construction and operation. The

municipal advisory group has approved several resolutions and recommendations (listed in Appendix A: Municipal Advisory Group Resolutions, of this document). Most of the municipalities participating in the Municipal Advisory Group also have approved the resolutions individually. The Municipal Advisory Group continues to meet and is circulating and discussing several resolutions still in draft form.

STRANDED GAS DEVELOPMENT ACT APPLICATIONS

The State of Alaska received Stranded Gas Development Act applications from the following parties:

1. BP Exploration (Alaska) Inc., ConocoPhillips Alaska, Inc., and ExxonMobil Alaska Production, Inc. (January 13, 2004)
2. MidAmerican Energy Holdings Company and MEHC Alaska Gas Transmission Company, LLC (January 22, 2004)
3. Alaska Gasline Port Authority (February 27, 2004)[4]
4. Enbridge, Inc. (April 30, 2004)
5. TransCanada Corporation and Alaska Northwest Natural Gas Transportation Company (June 1, 2004)

The Enbridge application is still pending an agreement between Enbridge and the state for terms of contract negotiation. MidAmerican withdrew its application. TransCanada's reimbursement agreement with the State of Alaska was not signed until August 26, 2004, too late to be included in this study. Thus the only SGDA application considered to date by the Municipal Advisory Group and by the study team is the application submitted by the group of major North Slope oil and gas producers—BP Exploration (Alaska), ConocoPhillips Alaska and ExxonMobil Alaska Production—referred to in the application and throughout this study as the Sponsor Group.

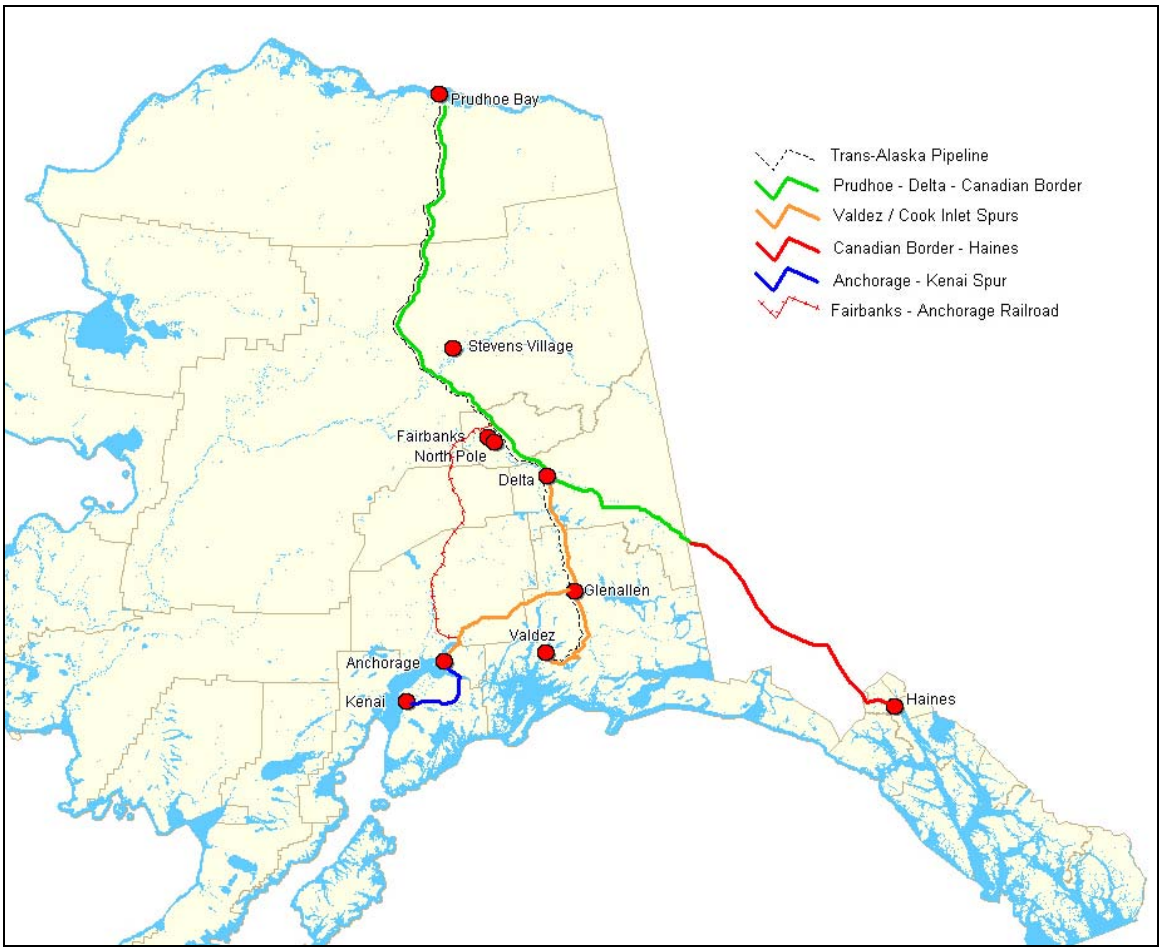
The Alaska Natural Gas Development Authority, a public corporation of the State of Alaska, has unique bonding and tax status and does not require a Stranded Gas Development Act application. The Alaska Gasline Port Authority (AGPA) withdrew its application and now has a *protocol agreement* to work with the State of Alaska on gas pipeline issues, with the right to resubmit it at a later date. Both of these entities are conducting studies and seeking funding and approval for separate or joint gas pipeline projects.

THE SPONSOR GROUP APPLICATION

As outlined in its application to the state, the Sponsor Group project would include a natural gas pipeline and related facilities with a design capacity to transport approximately 4 billion cubic feet per day of stranded gas from the Alaska North Slope to markets in both Canada and the continental United States. The preliminary design calls for a gas treatment plant

[4] The State of Alaska did not accept the AGPA application, and instead signed a protocol agreement with AGPA.

(GTP) on Alaska's North Slope, a 52-inch buried pipe from Alaska to Alberta, a potential natural gas liquids (NGL) plant in Alberta, and a potential pipeline from Alberta to Chicago. The gas in the Alaska portion of the pipeline would be compressed and chilled in a gas pipeline operating at approximately 2500 pounds per square inch.



Source: Information Insights, Inc. 2004

Figure 1: Map of proposed gas pipeline routes

A conceptual study for this project was conducted for the Sponsor group in 2001 and 2002. The study cost approximately $125 million and addressed costs, technology, and regulatory and environmental issues associated with the project. While the technical specifications were used to develop the Sponsor Group's application, the application notes that "design details (including export rate, pipeline size, compressor location, etc.) are likely to change as engineering progresses further."

The Sponsor Group states in its application that the intent of a contract would be "to establish simple and clear State fiscal and royalty take terms, to eliminate ambiguity, and minimize project administrative costs. Furthermore, the State take terms should enhance the competitiveness of an Alaska Gas Pipeline Project to encourage this enormous, unprecedented investment. Finally, the contract must ensure that take terms would not change to the detriment of the Sponsor Group after the agreement has been signed."

THIS STUDY

Negotiation of an SGDA contract requires that the State of Alaska understand the impacts on state and local governments from the development of a natural gas pipeline. The state initiated the study to support the Municipal Advisory Group discussions and to inform the state about economic, social, cultural, and revenue impacts that Alaska communities would confront during pipeline construction and operation.

The Alaska Department of Revenue (DOR) requested that the study focus specifically on municipal impacts of the Sponsor Group's project, and that it include an analysis of impacts of the gas treatment plant to be built with the pipeline. "Upstream" impacts of gathering lines and other industrial infrastructure in areas between the gas fields and the gas treatment plant are a related area of study. Finally, inherent in the question of impacts of any stranded gas development scenario, is a consideration of the longer-term economic and social impacts of additional gas field exploration and development, which will occur once there is a way to get natural gas to market.

Based on the DOR requests, the Comment Draft of this report, submitted to the Municipal Advisory Group in late August, covered only municipal impacts of construction of the gas pipeline. The second Comment Draft, issued in September, extended that analysis to municipal impacts of construction of the gas treatment plant, and of operation and maintenance of the treatment plant and pipeline. Although the project itself does not include upstream activities, such activities cannot be separated from the project – the Sponsor Group acknowledges that additional gas may move through the pipeline. The study therefore includes initial discussion of impacts from upstream facilities and from projected exploration and development of new gas reserves on the North Slope.

The addition of the GTP and attendant upstream facilities significantly increases the social and cultural impacts on the residents of the North Slope Borough, including impacts on subsistence. Some of these impacts are speculative; others are real and significant, but impact subsistence users, and not municipal expenditures. The full extent of social and cultural impacts from commercialization of North Slope gas reserves is outside the scope of this report, but it must be noted that if activities associated with gas development negatively impact bowhead whale populations (from activities such as dredging in order to accommodate larger barge loads being delivered to the Prudhoe Bay docks), the social and cultural impacts may be incalculable in financial terms. Furthermore, the potential for detrimental effects on caribou, waterfowl, and many other aquatic food sources increases in tandem with increased upstream activities.

Further work may be required for the state and local governments to determine impacts of construction and operation of gas pipelines that run from Interior Alaska to Cook Inlet or Valdez, or that extend from the Yukon Territory to Haines, Alaska, ultimately connecting to the proposed Sponsor Group pipeline. The Alaska Natural Gas Development Authority prepared an initial study of benefits that may accrue from in-state use of natural gas.

Several components of a more comprehensive socio-economic impact statement fall outside the scope of work presented in this report. Information Insights examined impacts to municipalities so that the municipalities could proceed in discussions with the state and the developers of the gas pipeline with a greater understanding of how the project might affect

local residents and municipal governments. For example, we did not examine potential changes in the culture of the communities or neighborhoods that might be affected, as would have been addressed in a thorough assessment of socio-economic impacts. Nor did the time and scope of this study allow for interviews with village residents to present a full picture of impact projections for their point of view.

The most important social impacts that do not fall within the scope of this work include those that address issues of environmental and social justice as well as changes in the "feel" of communities or neighborhoods along the project route. Of particular concern are impacts to the elderly, disabled, non-drivers, transit-dependent, and racial and ethnic minority groups. Direct and indirect impacts may include changes in structure, function, cohesion, and/or availability of:

- School districts (other than student numbers)
- Recreation areas
- Churches
- Police and fire protection
- Private sector business
- Local housing markets
- Certain groups that are benefited or harmed specifically by the project
- Neighborhoods or communities
- Traditional lifestyles in Native villages

Environmental justice addresses impacts of projects that disproportionately affect what are defined as special populations, i.e. the elderly, disabled, minority and poor. Many communities and regions through which the gas pipeline will travel will ultimately fall under the category of having special populations because of the large Alaska Native population in rural Alaska. Other discrete, ethnic communities could also be affected.

The socio-economic impacts portion of this report focuses on economic impacts to local governments and communities – a significant but not comprehensive picture. There are extenuating and complex economic impacts resulting from this project that will occur in Alaska, Canada, the continental U.S. Consequently, state and local governments, as well as, private citizens and private businesses residing in these locations will be affected. Additionally, there will likely be economic activity in the future as a result of the increased infrastructure and increased oil and gas exploration on the North Slope of Alaska. These very real impacts are not considered for the purposes of this report.

Opportunities for local hire are of great interest to local governments. The level of local hire and gas pipeline project wages will affect wages throughout the economies of the local governments. Employment of the residents of affected municipalities also will impact local spending and property ownership, and thus taxation.

It must be emphasized that the analysis and conclusions of the current study are based on the technical and conceptual planning documents provided by the Sponsor Group. Many of these documents were drafted up to three years ago and have not been updated. To the extent that design details do change as engineering progresses, the size and distribution of state and municipal impacts will also change.

CONFIDENTIALITY OF SPONSOR GROUP DATA

Major portions of the Sponsor Group's conceptual study are confidential, proprietary, and protected from public disclosure under the SGDA. The Information Insights study team had access to the Sponsor Group's data room in the course of this study but is bound by a confidentiality agreement with the Sponsor Group and the state to hold in confidence all information not publicly disclosed by the Sponsor Group or otherwise available from public sources.

PUBLIC DATA SOURCES

TransCanada Right-of-Way (ROW) application. TransCanada is one of the companies interested in developing a natural gas pipeline from Alaska's North Slope. The SGDA application and subsequent application for right-of-way that TransCanada submitted to the state provides more logistical information than has been made public by the Sponsor Group. Public information from both groups regarding the proposed gas pipeline is similar in many ways, but the TransCanada application provides more specific information regarding many issues that are critical to the affected municipalities. For this reason, a brief look at TransCanada's proposed project may be illuminating, even though it is outside the explicit scope of the current study.

According to the TransCanada application, construction of the gas pipeline will take roughly three years including pre-construction activities. Approximately 8,000 people will be employed in Alaska at peak construction. Assuming an agreement by mid-2005, pre-construction activities could begin in the fourth quarter of 2008 (earlier than the Sponsor Group' timeline) with commercial operations beginning in 2012 (again earlier than the Sponsor Group's timeline). Estimated cost of construction and installation is approximately $4.8 billion. Estimated annual cost of operation and maintenance is $74 million (both in 2004 dollars). Note that the construction and installation number is for the Alaska segment only, and does not include gas treatment plant costs.

The entire gas pipeline is planned to be 4,800 miles long originating in Prudhoe Bay, traveling 1,750 miles through Alaska and Canada to Alberta, where it will split into two lines, one terminating in Chicago, Illinois, and the other in Antioch, California. The pipe will be 48 inches in diameter, constructed of X-80 steel that is 1.042 inches thick along most of the pipe. The pipeline is expected to have a useful life of at least 50 years.

The proposed route follows the TAPS corridor until milepost 535 at Delta Junction. From there the line will continue southeasterly, generally along both the Haines pipeline right-of-way and the Alaska Highway unto the Canadian border. The total length of the Alaska segment is 745 miles, crossing 365.9 miles of state-owned land. The width of the temporary construction right-of-way is 500 feet on land, except where the pipe has to cross a river, at which point the requested right-of-way is 600 feet. Permanent right-of-way on state land is requested for 100 feet, except at certain specified locations where a wider right-of-way is necessary. The permanent requested right-of-way for pipeline-related facilities is 50 feet outside of any structure.

TransCanada reports that the company took many criteria into consideration when evaluating options for the route of the Alaska segment of the proposed gas pipeline. These criteria include, but are not limited to, the utilization of existing transportation corridors and maximum use of existing facilities (work pads, highways, access roads, airports, material sites, disposal sites and communications). In addition, they include minimizing:

- Crossings of roads and highways
- The distance between the new gas pipeline and TAPS
- Any adverse impacts on the environment by avoiding sensitive areas

The pipeline will be buried for the vast majority of the route, only coming above ground where necessary, such as at compressor sites and metering stations and at up to five aerial river crossings. Potential placements of such crossings occur at mileposts 231.8, 233.7, 363.2, 540.5 and 667.6.

From the North Slope to the Yukon River, the major rivers that will have to be crossed include: Atigun, Dietrich, the Middle Fork of the Koyukuk, Hammond, the South Fork of the Koyukuk, and Jim. South of the Yukon, rivers include the Tatalina, Chatanika, Little Chena, Salcha, Tanana, Gerstle, Johnson, Robertson, and Tok. There are many smaller waterways; among them: Hess, Tolovana, Prospect, Gardner, and Scottie Creeks.

Temporary facilities to support construction of the proposed gas pipeline include the pipeline and compressor station construction camps, airfields, access roads, material sites and storage sites. Some of these facilities, such as airstrips, already exist and are not temporary, but will be utilized by activities supporting the gas line on a temporary basis.

Construction camps. There will be 16 construction camps, plus one in Fairbanks that will serve as construction headquarters. Construction camps along the route will be located at 13 already existing sites and three proposed new sites.

- Existing camp sites under consideration: Franklin Bluffs, Happy Valley, Toolik, Galbraith, Atigun, Chandalar, Dietrich, Coldfoot, Prospect Creek, Old Man, Five Mile, Livengood, and Delta
- New camp sites under consideration: Knob Ridge, Tok, and Northway
- Camp footprints are predicted to be roughly 30 to 35 acres
- Camps will be built to accommodate 1,700 people including office and support activities
- Camp size will vary from 250 to 1,700 people
- Each camp will have helicopter landing pads for emergency and other use
- Each camp's staff will include paramedics equipped to provide treatment of minor ailments and first aid as well as to stabilize those with more serious injuries until they can be moved to the closest appropriate treatment center
- Camps are designed to be self-contained, including power, lighting, incineration and sewer systems

TransCanada expects only four of the camps to be in operation at any given time. Existing sites, where gravel pads and basic infrastructure are already in place, will be used when at all possible to reduce costs and minimize environmental impacts. Additional camps associated

with pipe logistics and pre-construction activities will be significantly smaller, and no specific information has yet been provided.

Compressor stations. Construction camps built to accommodate 150 to 250 people will be located at compressor station sites. There is no information yet provided that indicates how many camps of these camps will be operational at any given time. All compressor stations will be outfitted with emergency quarters for the purposes of performing maintenance and repairs. Once construction is complete, no one will be on site for day-to-day operations at the compressor stations.

Airfields. Ten private and two public airfields will be used. Additionally, airports in Anchorage, Fairbanks and Deadhorse may be used during construction and operation of the pipeline. No new airfields are planned.

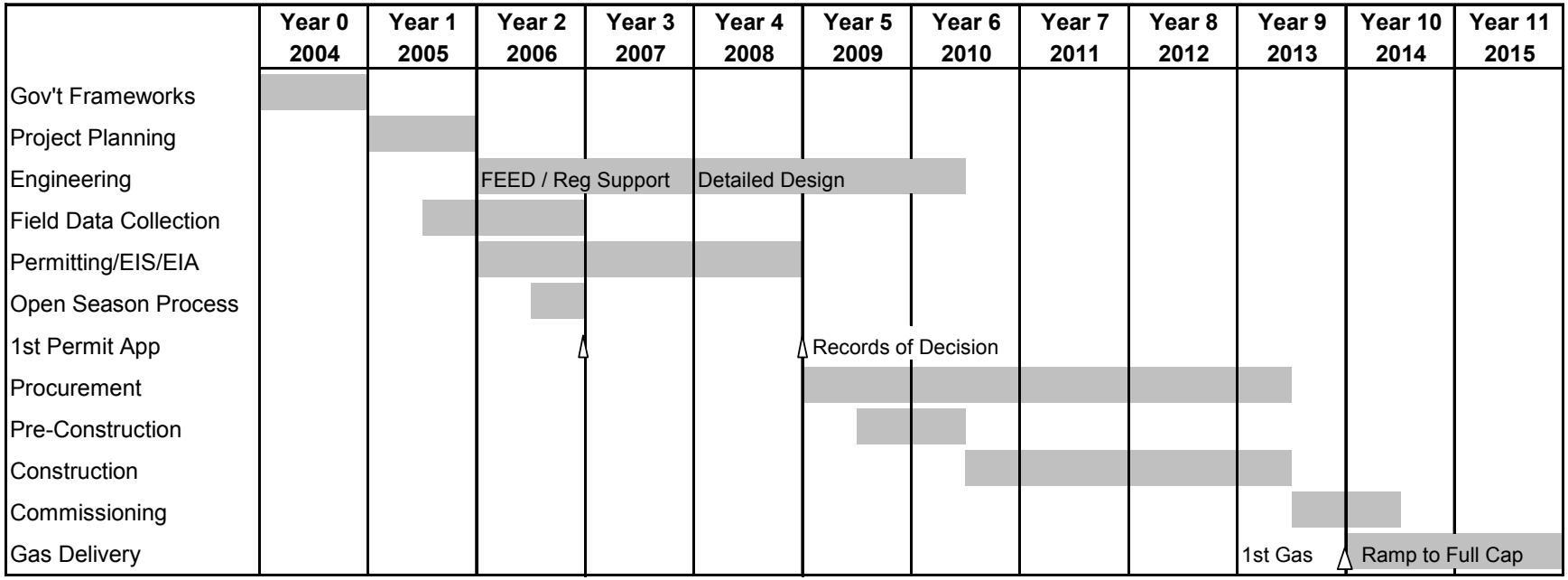
Material sites and storage yards. Where possible, areas used for site storage will include abandoned stockpiles from old mining operations and large unvegetated gravel bars. These two types of sites will have priority because they provide the least impact to the environment. After these options have been exhausted, other sites with negligible environmental impact will be sought. Available sites used during TAPS will be utilized first for storage of materials on the proposed gas line project.

Construction schedule. Most construction activity will occur in winter months; ice roads and pads will be used where appropriate. Winter activity has the added benefit of occurring at a different time of year than most major subsistence activities, thus reducing impacts to subsistence harvesting. Additionally, direct impacts to wildlife are reduced as many animals migrate out of the project area during winter months.

Communications. Existing communications systems will be used to the extent possible.

TransCanada's application to the state acknowledges that municipalities will be affected and reports that they will work with local and state governments as well as Alaska Native groups and community members to develop programs to mitigate negative impacts. Much information will come to light during the required work to complete an in-depth Environmental Impact Statement for the project. TransCanada expects the company and communities to work cooperatively to minimize impacts and find solutions.

TransCanada included in its application a statement regarding local hire and Alaskan employment. The company has indicated that it will work with the university, the state, and existing training programs to develop programs and plans that will get as many Alaskans ready for gas pipeline jobs as possible.



Source: Sponsor Group application (Year designations added by Information Insights.)

Figure 2: Conceptual project timeline

The Sponsor Group's application presents the above conceptual timeline for planning and constructing the natural gas pipeline and related facilities. For purposes of this study, we have added designations for specific years to the timeline. This timeline designation assumes that government frameworks for the project are in place by the end of 2004.

Under this schedule, planning and data collection would begin in 2005, followed by engineering and permitting work in 2006. [Permits include U.S. National Environmental Policy Act (NEPA) and Canadian Environmental Assessment Act decisions, U.S. Federal Energy Regulatory Commission and Canadian National Energy Board records of decision (approvals)].

Procurement and pre-construction activities—right-of-way clearing, camp construction, pads, etc.—would begin in summer 2009, and construction in summer 2010. Construction work would be completed in mid-2013, with gas beginning to flow in 2014.

III. The TAPS Experience

The proposed Alaska Gas Pipeline Project is a mammoth project, estimated to cost more than $21.5 billion (2004 dollars). The Alaska portion, including gas treatment plant, gas pipeline, and associated facilities, is expected to cost at least $6.9 billion (2004 dollars).

In its application, the Sponsor Group recognized that "a project of the size and scope of the pipeline project would create demand for public services in communities throughout Alaska…the Alaska Gas Pipeline Project, given its scope and scale, would place significant demands on worldwide resources for materials, equipment and skilled labor."

There are few projects of this magnitude built in the world. Little data or information exists to assist project planners or state officials in accurately estimating impacts of construction of the proposed gas pipeline.

The best historical reference for this project found by the Information Insights study team is again the Trans Alaska Pipeline System, constructed from 1973 to 1977. The TAPS project cost $7.7 billion (1977 dollars) and employed over 21,000 persons at the peak of activity. It was built in an arctic and subarctic environment, within the context of Alaskan political, economic and social systems. Thus, while TAPS cost more than 3 times as much in real dollars as the estimated cost of the entire Sponsor Group project (including Canadian segments), the study team feels that TAPS is nonetheless the best project from which state and municipal planners can learn.

	TAPS, as built ($ Billions)	**Alaska Gas Pipeline Project, estimated** ($ Billions)	**Ratio: Gas Pipeline Project to TAPS**
Costs in 1977 dollars			
Alaska portion (gas pipeline and gas treatment plant)	$ 7.7	$ 2.2	29 percent
Entire project	$ 7.7	$ 6.9	90 percent
Costs in 2004 dollars			
Alaska portion (gas pipeline and gas treatment plant)	$ 24.0	$ 6.9	29 percent
Entire project	$ 24.0	$ 21.4	90 percent
Comparison uses U.S. CPI as inflator/deflator			

Table 2: Comparison of TAPS and gas pipeline costs

The Sponsor Group has also recognized the importance of TAPS for impact planning, noting in its application: "From the industry's experience during the construction of TAPS, it is clear that adequate planning is needed to mitigate demands for public services."

The lessons that can be reasonably drawn from the TAPS experience have more to do with the types of impacts to be expected rather than the size of impacts. This is true not only because of the difference in relative cost of the two projects. In the more than 30 years since TAPS construction began, the Alaska population and economy have grown significantly. Alaska's pre-pipeline population—326,600 in 1972—had almost doubled to an estimated 648,800 by 2003. The state's economy and workforce have grown correspondingly. The structure of the state's economy today has far more breadth and depth than it did 30 years ago, as evidenced by the fact that the state's construction labor pool alone is now almost equal to the total TAPS workforce at the peak of construction. As a result, the magnitude of impacts of the proposed project on the state and municipalities will be far smaller than was the case with TAPS.

There are some additional reasons why impacts of a natural gas pipeline project will likely occur on a smaller scale than those experienced during TAPS construction:

Lack of adequate infrastructure. Prior to the start of construction, Fairbanks, Valdez and other Alaska communities were starting from behind. They had not invested in adequate infrastructure for their pre-pipeline size, let alone planned for the needs of a project with the magnitude of TAPS.

Lack of planning. Many negative impacts of TAPS construction could have been avoided or minimized with better planning. Housing shortages, school overcrowding, teacher shortages, inadequate roads, telephone systems and other infrastructure, and inadequate or nonexistent zoning regulations were some of the negative experiences that could have been addressed through better community planning. The ability of municipalities to plan for impacts was limited without specific, concrete, actionable knowledge from industry on project plans and timelines. State government could have assisted municipalities more by providing support and financial help for planning efforts prior to construction. During TAPS construction, the commitment of state monies for impact needs came only after the impact was demonstrated; when it did come, impact aid was often less than anticipated (Baring-Gould, 1976).

Relative economic health. TAPS construction began during a period when the rest of the United States was going through a severe economic slump. Population growth statewide during TAPS construction and the "oil boom" that followed would not have been as great if the differences in economic health between Alaska and other states had been less distinct.

State wealth sharing. The induced and post-construction impacts of TAPS were magnified considerably by the state's decision to share its newfound oil wealth through capital projects, school debt reimbursement programs, subsidized mortgage rates, power cost equalization, Permanent Fund Dividends, and other forms of distributing its newfound wealth. Without revenue sharing and special appropriations, some municipalities would not have been able to pay for some post-construction impacts of TAPS construction, such as the replacement of infrastructure that wore out during pipeline construction, most notably roads.

Changes in corporate culture. While corporate social responsibility was not a major consideration in the 1970s, today there is an expectation nationally and in Alaska that corporations will play an active role in the communities in which they do business.

Alyeska Pipeline Service Company (Alyeska) made it clear both prior to and during construction that they were in town to build a pipeline, not to provide social services. Alyeska and the Sponsor Group companies have since become significant benefactors of social services in Alaska.

Another aspect of corporate culture that has changed is tolerance for drug and alcohol use. During the building of TAPS, drug and alcohol use were rampant. Today the industry claims to have a zero- tolerance policy of drinking and drug use among workers, and there is a strong emphasis throughout the industry on safety. Moreover, Congress has since enacted a vast array of laws banning alcohol or drug use by anyone engaged in the transportation of people or volatile commodities such as oil and gas. Although it may be realistic to assume that, regardless of laws or policies, the combination of a predominantly young workforce that is away from home and has considerable disposable income will result in some drug and alcohol use, it is highly unlikely that these behaviors will be tolerated to the degree they were in the 1970s.

The discussion of the TAPS experience that follows is necessarily incomplete. Data on various types of impacts for the many communities affected is unevenly available. Although it would be a worthwhile project in its own right, a comprehensive, statewide analysis of TAPS impacts is beyond the scope of this study. The Information Insights team reviewed a small portion of the many works that have reflected on this period, identifying those sources that were felt to be the most relevant to the current discussion.

What follows is a summary of some of the socio-economic impacts experienced by municipalities and villages during TAPS construction. The discussion focuses on communities that were most directly affected by the construction phase of the project from 1973 to 1977: the North Slope Borough, Fairbanks and Valdez, and to a lesser extent on other communities along the pipeline corridor. Cities and villages throughout the state were affected by secondary and post-construction impacts of the pipeline, including population growth and the huge growth in state spending that occurred after oil started flowing. A look at some of the ways these factors impacted the Municipality of Anchorage and the Kenai Peninsula Borough concludes the section.

THE TAPS EXPERIENCE IN THE NORTH SLOPE BOROUGH

The development of North Slope oil reserves has brought more change to the region in the last 60 years than occurred in the previous 10,000 years. Taken together, the degree of social, political and economic change brought about by TAPS has been astounding. No other region of Alaska has been so transformed. The impact of industrial development was much greater for having occurred in a region that had little to no infrastructure to begin with. When construction began, the North Slope had no water or sewer systems, no washeterias, one clinic, very little bulk fuel storage, and no permitted landfills. At the time of development, the new borough was just assuming control of education responsibilities from the U.S. Bureau of Indian Affairs (BIA).

The impact of TAPS on the North Slope was not limited to the development of the first oil fields and the construction of the pipeline. The expansion of exploration and development activities has continued up to the present day, extending the footprint of

development— and its impacts—well beyond what was originally envisioned. In the 1960s there was a single operational oil field at Prudhoe Bay. By 2001 there were 19 producing oil fields, 115 gravel drill sites, 20 pads with processing facilities, 115 pads with other support facilities, 91 exploration sites, 13 offshore exploration islands, 16 airstrips, 4 exploration airstrips, 1,395 culverts, 596 miles of roads and permanent trails, 450 miles of pipeline corridor, and 219 miles of transmission lines. (TAPS Right-of-Way Renewal, Final EIS, 2002)

In some ways the significant impacts of TAPS construction on the Native people of the region mirrored the experiences of other Native American groups impacted by energy development on or near their lands. In general, socio-economic studies have found a poor correlation between oil and gas activities and the overall well being of Native groups in the U.S. and Canada (Kruse, Kleinfeld, and Travis, 1982):

- The major potential benefit of energy development is employment opportunities, but jobs are not necessarily structured so Native groups can take advantage of them.
- To the extent that Natives are hired, energy employment tends to create a small elite group of high wage earners, increasing income inequality in Native communities.
- Energy industry wages are typically spent outside Native communities to the benefit of non-Native businesses.
- Energy development has contributed to the growth of large, prosperous White settlements; this growth has bypassed many rural Native communities.
- Not only have Native standards of living typically not increased with the development of energy resources on or near Native lands, but also communities have experienced increased social problems, including alcohol and drug abuse, greater violence and family breakdown.

However, Kruse, Kleinfeld and Travis (1982) point to two reasons why the experience of the North Slope population during TAPS was generally more positive than that of Native groups elsewhere:

- Through successful litigation, the predominantly Native population won the right to form the North Slope Borough and gain local property taxing authority, which it used to tax oil properties.
- The distance from Prudhoe Bay to the nearest settlement is over 50 miles, a fact that may have minimized some of the deleterious social and subsistence impacts.

The new borough's hard-won taxing authority did a great deal to expand the economic benefits of oil development to the population as a whole and prevent the increase in income inequality seen elsewhere. Tax revenues were used to expand government services and public-sector jobs and fund an ambitious capital improvement program (CIP), which resulted in improvements to schools, roads, housing, sanitation and other public facilities while further expanding job opportunities across the region. In the absence of any significant state or federal presence in the borough or a mature private sector, the newly formed borough felt that if it didn't provide jobs to its residents, no other level of government would provide these jobs.

There is a conceptual difficulty in assessing the impacts of TAPS on the North Slope Borough: to what extent were the changes manifested in the borough due to TAPS construction specifically; to what extent are they attributable to the development of oil development activities generally; and to what extent attributable to the simple availability of money to people unaccustomed to its availability?

A complete analysis of all effects of oil and gas exploration, development, production and shipment through TAPS is beyond the scope of this report, which focuses on impacts of gas pipeline project construction on Alaska municipalities. There exists a substantial body of research on ongoing TAPS impacts, portions of which are cited in the bibliography. In particular, substantial work by the Minerals Management Service and the Institute of Social and Economic Research at the University of Alaska Anchorage need to be considered when the complete Environmental Impact Statement for the gas pipeline project is prepared. A brief summary of cumulative impacts is contained in Section IX of this report.

The following summary of changes in the North Slope focuses more narrowly on the period of construction. Many of the observations made on socio-cultural impacts on the region were compiled from household surveys[5] conducted in 1977 and 1978 as part of the National Science Foundation's "Man in the Arctic Program," which examined the effects of oil development in Alaska's urban and rural populations, and from public health records and other data.

Population. The population of the North Slope increased from 3,333 to 4,199 between 1973 and 1980. Although the overall increase was 26 percent for the borough as a whole, some communities grew at a much faster rate. While Barrow experienced only a 5 percent increase in population, Anaktuvuk Pass grew 51 percent, Nuiqsut grew 63 percent and Point Lay grew 119 percent over the seven-year period. Stephen Braund (1984) points out that traditional villages in the North Slope Borough grew 24.5 percent between 1970 and 1980. During this same time there was a 23 percent increase in the non-Native population. (The North Slope population totaled 2,076 in 1960, and 3,075 in 1970, according to U.S. Census figures. Village counts are not available for those years. The population of the region had actually grown at a faster rate from 1960 to 1970 than it did during the pipeline era.)

[5] The survey sample included all households in Point Hope, Wainwright, Nuiqsut, Kaktovik and Anaktuvuk Pass, and a 50 percent random sample of Barrow households. Seventy-five percent of the selected households were interviewed.

	1939	1950	1973	1980	1988	1990	1993	1998	% change 1973-80
Anaktuvuk Pass	---	66	134	203	264	259	270	314	51%
Atqasuk	78	49	---	107	219	216	237	224	---
Barrow	363	951	2,167	2,267	3,335	3,469	3,908	4,641	5%
Kaktovik	13	46	144	165	227	224	230	256	15%
Nuiqsut	89	---	128	208	314	354	418	420	63%
Point Hope	257	264	376	464	591	639	699	805	23%
Point Lay	117	75	31	68	132	139	192	246	119%
Wainwright	341	227	353	405	514	492	584	649	15%
NSB Total	**1,258**	**1,678**	**3,333**	**4,199**	**5,567**	**5,792**	**6,538**	**7,555**	**26%**

Source: North Slope Borough

Table 3: Population growth of North Slope communities, 1939-98

Labor force impacts. At the peak of construction in 1975, employment at Prudhoe Bay topped 6,000, and averaged 3,000 in the years following. Thus peak employment exceeded the total population of the borough at the time. Despite the large number of jobs available, the direct and indirect effects of pipeline employment on the borough were not great.

According to industry personnel records, only seventeen percent of the adult Native population worked on the pipeline project during the construction phase of the project, and less than half of those worked for more than eight weeks. This limited the direct benefits of TAPS to the Native population. Employee housing and support services were provided at construction sites, with most pipeline workers taking direct flights between Prudhoe Bay and the original hiring points of Anchorage and Fairbanks. This served to limit the indirect economic impacts on North Slope communities. The relative attractiveness of pipeline employment for North Slope residents was likely reduced by the existence of local jobs through borough government and CIP projects that paid comparable wages to jobs at Prudhoe Bay.

The most profound result of the NSB formation and the CIP was the creation of high-paying local jobs. Through strong local hire programs in both the CIP and government operations, the borough became the largest employer of Native residents. Almost half of the jobs held by Inupiat adults came from the borough government and school district. Most men were employed as construction workers in the CIP. The effect was that median household income rose, while income inequality did not.

The average weekly wage of North Slope workers in 1977 was almost $500 per week, and about one-quarter of the workforce made $800 or more per week. The borough

structured jobs to minimize conflicts with traditional subsistence activities, granting leaves of absence and generally rehiring those with irregular absences from work.

While the borough had at some time employed about 57 percent of the adult Native population (and roughly 75 percent of young adults, aged 18 to 24), periods of employment were often short—an average of 17 weeks for men and 23 weeks for women—due to both personal preferences by men and women for part-year work and due to lay-offs, especially of blue-collar men when construction projects ended. Although North Slope incomes remained far below those in urban Alaska, through its local hire and CIP programs, the North Slope Borough made it possible for borough residents to share in the general growth realized in the rest of Alaska during the TAPS era: family incomes in the North Slope increased 2.5 times between 1970 and 1977, the same proportionate increase experienced by Alaskan families in general.

Government services and revenue impacts. The budget of the NSB climbed from $528,000 in 1973 to almost $60 million six years later. Sixty percent of the borough's budget in 1979 came from property taxes on TAPS infrastructure. Another 24 percent came from governmental transfer payments. The ambitious CIP was funded at $511 million dollars.

Transportation and utilities. The James Dalton Highway, which connects Prudhoe Bay with the road system in Interior Alaska, was built as part of the TAPS project. The Dalton Highway has provided access to the region to the general public since the state opened the road to public use year round. According to the NSB, the construction of the Dalton Highway—and new roads in general—has had a greater long-term impact on the region than any other aspect of development. The construction of new roads leads to permanent change, creating activity that wouldn't otherwise exist. While the pipeline can be seen as a temporary event, a road is a paradigm shift in the local culture.

The community most directly affected by the construction and use of the Dalton Highway is Anaktuvuk Pass. Anaktuvuk Pass lies in the central Brooks Range roughly 49 miles west of the TAPS. The small Alaska Native population that lives in this community relies heavily on subsistence activity for economic and cultural purposes, most notably on caribou.

Improvements in air transportation, water and sewer services, and local energy production during the period were primarily the direct or indirect result of the NSB's capital improvement program, funded by oil property tax revenues.

Law enforcement and emergency medical services. During the original TAPS construction, the North Slope Borough was not in a position to offer many of the law enforcement and emergency medical services (EMS) for which it is now responsible. Alyeska and its contractors remained responsible for all EMS during construction.

Health and social services. Better health clinics and improved access to health care generally were two of the social benefits of borough spending and investments in health care infrastructure. The increased availability of wage employment resulted in a decrease in the number of North Slope residents needing public assistance. General assistance payment cases fell from 293 in 1974 to 58 in 1976, according to BIA data.

Among the health and social problems observed during the period were increasing rates of alcoholism, suicide, homicide and accidental death. Native perceptions of social problems also heightened over the period, with the number saying that levels of drinking, drugs, fighting and stealing were "good" falling from 36 percent in 1970 to 4 percent in 1977. However, it is difficult to assess how much of this change was the indirect result of oil development and how much was the continuation of longer-term trends. Kruse et al. (1982) suggested that the pattern of change for suicide and accidental death on the North Slope was a continuation of historic trends. The high rate of homicide (30.7 per 100,000) between 1972-77 as compared to earlier periods (5.7 per 100,000 between 1960-71), though related to alcohol, was concentrated in two families and was not a community-wide phenomenon.

Education. School enrollment numbers are not uniformly available for the first few years the borough was incorporated. Numbers for some schools are missing and others are illegible. Figure 3 shows available school enrollment data. (Where recorded district totals do not equal the sum of village school enrollment, the discrepancy is noted.)

Source: North Slope Borough School District. (1974 Barrow enrollment estimated.)

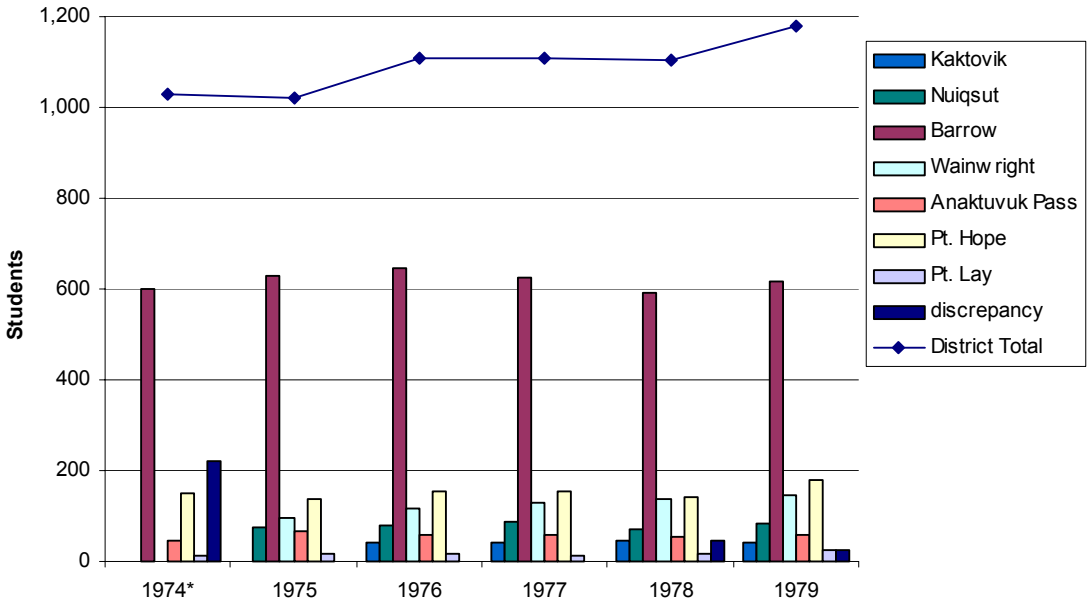


Figure 3: Enrollment in North Slope Borough schools, 1974-79

After the 1972 Hootch v. Alaska State Operated School System lawsuit and the 1976 Tobeluk v. Lind consent decree, the borough was compelled to build schools in each of its villages so Native children could attend school in their home communities. Bonding ability that came with new property tax revenues helped, but since NSB had no schools to begin with—unlike other parts of the state—the financial burden on the borough was significant. The problem for the borough was exacerbated by the fact that it did not resolve its property tax case with the Sohio Petroleum Corporation until 1978.

Social and perceived impacts. Adults surveyed in 1977-78 perceived a mixed picture of positive and negative change to their communities since 1970. The creation of jobs was the greatest perceived benefit. Following jobs, residents noted improvements in air transportation; the amount of home living space; and the quality of health care and village schools.

Negative changes mentioned included less fish and game; higher prices for food and clothing; more drinking, drugs and fighting. Overall, 35 percent of respondents perceived that village conditions worsened since 1970, while only 7 percent felt that conditions had improved.

Sixty-nine percent of residents thought that the borough had generally met their needs, but were unsure if it had effectively controlled oil development on the North Slope. Residents were evenly divided on whether the effects of overall oil development were good, bad or mixed (20 percent each). Respondents expressed anxiety about the increased availability of money and its effects on traditional culture.

Subsistence. The period of TAPS construction saw an increasing number of North Slope residents move into the mainstream economy through increasing wage employment. The expansion of a cash economy in the region had a paradoxical effect on subsistence as Native residents had less time, but more cash, to engage in subsistence activities. Higher incomes enabled more households to invest in the modern equipment increasingly used in subsistence efforts. In particular, higher incomes meant that more men could afford to form whaling crews. While the job demands meant Natives had less time to spend on subsistence efforts during the workweek, the changes in subsistence technology dramatically reduced the time needed for many activities. A survey of North Slope households in 1977-78 found:

- Men in households with incomes of $25,000 or more engaged in more subsistence activities than other men.
- Sixty-three percent of Inupiat adults reported that they spent less time on subsistence activities in 1977 than in 1970.
- Sixty percent of all subsistence activities took place after work or on weekends; another 7 percent took place on leave or vacation time.
- Seventy-five percent of respondents reported that they harvested fewer subsistence resources in 1977 than in 1970, but the reason given was related more to the availability of fish and game than to the amount of time to fish and hunt.

These changes, brought about directly or indirectly by TAPS, may have impacted the abundance and distribution of important subsistence resources. As TAPS construction neared completion in 1977, cash available to Barrow whaling captains resulted in an unexpected surge in the number of outfitted whaling crews at Barrow. Perceived over-exploitation of the bowhead whale population precipitated a crisis with the International Whaling Commission that year. Subsequent studies of whale populations were funded by the North Slope Borough (or raised by the borough from other agencies) to protect sufficient harvest quotas (Albert, 2001).

After bowhead whales, caribou are the second most important subsistence resource in the North Slope. The construction of the pipeline, roads, pads and other industrial

infrastructure were seen to disrupt migration routes. While caribou numbers were not negatively impacted, local availability and competition for the resource could be affected for some communities. Herds were deflected from traditional routes by industrial obstructions, noise and traffic. New roads increased access to subsistence harvest areas by non-local hunters increasing competition for village residents.

Subsistence impacts of TAPS have continued. On-going oil exploration and development efforts have increased noise, dust and pollution, and resulted in greater habitat loss while reducing the amount of land available for subsistence activities. A fuller discussion of the cumulative effects of oil and gas development on subsistence in the region is included in sections VIII. Subsistence and Socio-cultural Impacts and IX. Cumulative North Slope Impacts of this report.

Post-construction TAPS impacts. In building a transportation system, the TAPS owners created opportunities for exploration and development of new fields. Subsequent efforts to fill the pipeline have dramatically expanded the footprint of development and with it the attendant social, economic and environmental impacts.

The physical separation between North Slope communities and industrial activities has narrowed over time through the development of the Alpine project and westward movement of exploration past Nuiqsut into NPR-A. While the original construction occurred almost completely outside of the direct experience of the 3,000 to 4,000 residents then living in the North Slope Borough; that is no longer the case today. The people of the North Slope see, feel and taste the effects of oil and gas development every day.

One thing that the experience with oil development on the North Slope following TAPS should make it clear is that the presence of the gas pipeline system will bring new exploration and development. Exploration activities for the past 30 years have focused on increasing oil reserves. Following completion of the gas pipeline, new exploration for gas reserves can be expected. There are known gas accumulative farther south and west from existing activities, and farther out to sea. As new gas reserves are discovered, it can be anticipated that additional gravel pads, roads and feeder pipelines will be built. Just as TAPS impacts on the region did not end with construction of the pipeline, the impacts of the gas pipeline and treatment facilities on the borough and its residents will extend into the future for the life of the line and include the impacts of the exploration and development activities pursued to feed the gas pipeline.

THE TAPS EXPERIENCE IN FAIRBANKS

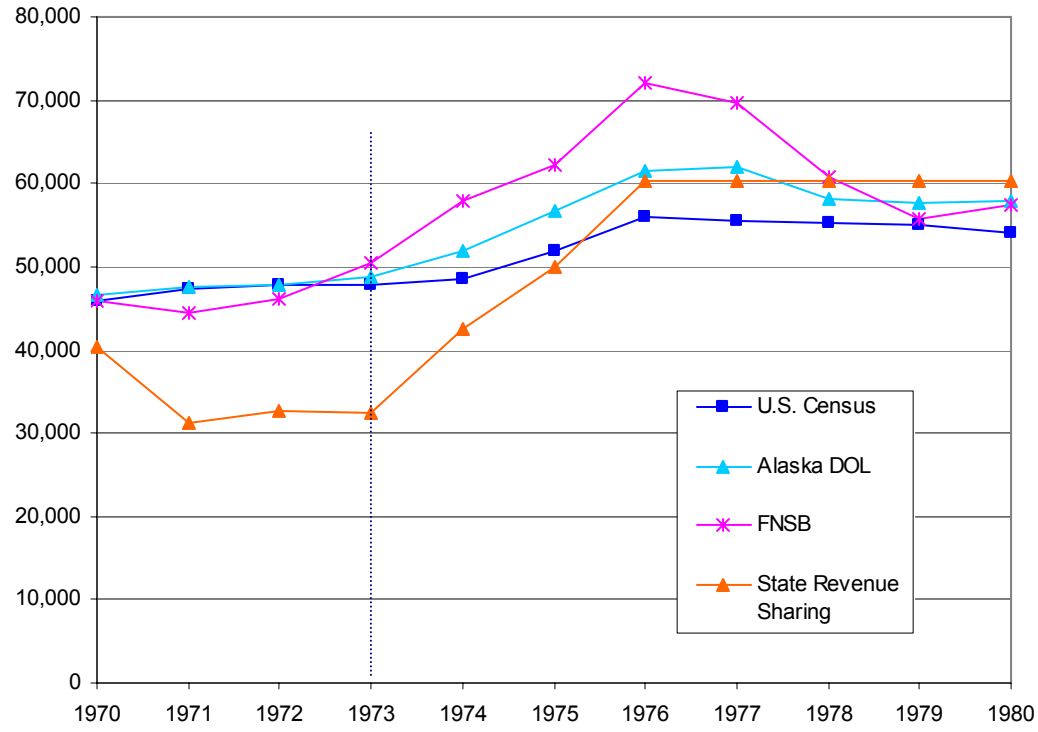
As the only urban Alaskan community located within the pipeline corridor, Fairbanks was positioned to serve as a service and supply center for TAPS, which would have been the largest private construction project in history. During peak construction, Alyeska estimated it spent $800,000 per day in Fairbanks. This dollar amount includes salaries to workers in Fairbanks, freight, including truck and aircraft, services bought directly by the company, fees to contractors, local materials and utilities and leases at Fort Wainwright.

Negative impacts included crowding, traffic, skyrocketing rents, and increased crime and poverty. Neither the city nor borough government, nor local businesses, addressed the social requirements of new residents until well into the construction period, with significant impacts on housing, electricity, telephone service, traffic, police protection, and cost of living. City officials were reluctant to raise taxes and voters were reluctant to approve bond issues during construction when public services were in greatest demand, and the tax base was at its largest level. Planning and use of impact funds to relieve the stress of pipeline impacts was generally characterized by residents as "too little, too late."

Fairbanks residents emerged from the pipeline construction period feeling that, while the pipeline had benefited individuals, the major changes to Fairbanks as a result of TAPS had made their community a worse place to live.

The most comprehensive look at the TAPS experience in Fairbanks was the 1978 publication, *What Happened to Fairbanks? The Effects of the Trans-Alaska Oil Pipeline on the Community of Fairbanks, Alaska,* by Mim Dixon, the director of the borough's Impact Information Office. Other important sources from the period were the findings of the community survey by Jack Kruse of the University of Alaska's Institute of Social and Economic Research, and the published reports of Sue Fison of the borough's Impact Information Center. These three sources were summarized in "Alyeska-Fairbanks Case Study," a technical report produced for the federal Minerals Management Service and published in 1978.

Population. At the time oil was discovered on the North Slope in 1968, the Fairbanks North Star Borough (FNSB) had an estimated population just over 42,000 people. The population slowly began to increase in 1969, when the plan for construction was submitted to Congress, and eventually peaked around 1976. At what size the population peaked is unknown. No census was taken in the borough between 1970 and 1980. Different federal, state an d local agencies developed varying estimates of the borough's population during the period. The estimates made by the U.S. Census Bureau, the Alaska Department of Labor, the Alaska Department of Community and Regional Affairs (for the purposes of state revenue sharing), and the FNSB Planning Department, differ widely prior to and during pipeline construction. (See Figure 4.)



Source: FNSB, Community Research Quarterly, Spring 1984

Figure 4: Fairbanks North Star Borough population estimates, 1970-80

Most of the population estimates were projections based on the 1970 U.S. census count for Fairbanks of 45,864. The U.S. Census Bureau's own projection clearly underrepresented the population by including only births and deaths in the formula and not accounting for any in-migration during the decade. Other estimates used standard methods to project population growth based on indicators such as school enrollment and new housing starts. However, the fact that only one of every 97 pipeline workers who moved to the area brought a family illustrates why these standard methods might have been grossly inadequate. The critical shortage in housing, which resulted in house "sharing" and a proliferation of temporary and substandard housing, is another reason why traditional projection models were flawed in the TAPS environment. The population figures that show the greatest growth (and probably come closest to the truth) come from the borough's planning department. They indicate a peak population of just over 72,000 in 1976, representing a 43 percent growth in population from 1973, or 57 percent growth since 1970.

Labor force impacts. The preparations taken by local government and business were based on the assumption that the numbers and projections prepared by the Alyeska Pipeline Service Company (Alyeska) were accurate. The original projection of peak workforce numbers during the construction phase was a maximum of 16,000 workers statewide; the actual number of workers was an estimated 21,600 workers, 35 percent more than expected.

State government provided very little in the way of workforce training to assist people in obtaining pipeline jobs until FY 1974-1975 when $1.6 million was allocated, $1.1 million from the state and $0.4 million from Alyeska. Training did not begin until well into the second construction season and there was no recorded follow up with trainees, so it is impossible to say whether or not those trained went on to get pipeline jobs.

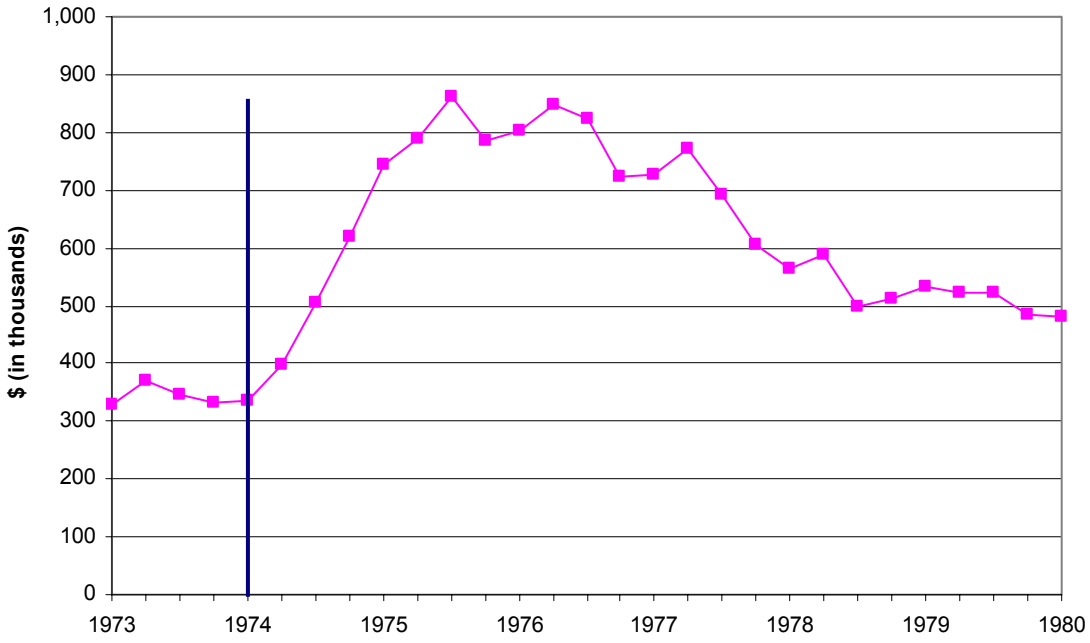
Hiring practices during the pipeline were a point of contention during construction, and continue to be a topic of debate to this day. Most hiring was done through union halls and union members were first in line, including union members from out of state. At the peak of pipeline construction (December of 1975) Alaska residents comprised 41.4 percent of pipeline workers. The definition of Alaska resident was fuzzy, however, so it is difficult to judge the accuracy of this number. Alaska residency could be proven in 1974 with an Alaska driver's license, a document easily obtained in one or two days from the local Division of Motor Vehicles. Women and Alaska Native people were the least employed groups on the pipeline. There were suggestions from government that Alyeska and the unions could do more to hire women and minorities for pipeline jobs, but there was little impact from that suggestion. Women and minorities continued to be underrepresented in the pipeline workforce.

Public safety. Public Safety became a major issue during the construction period, the biggest problem being the severe shortage of police officers. Both the Fairbanks Police Department and the area Troopers lost many employees to the pipeline companies, who were hiring them on for higher wages as security people. At the same time as police officer numbers were declining, the population was soaring.

Crimes, such as child neglect, increased as parents working out of town or in 10- to 12-hour shifts left their children unsupervised due to lack of adequate or affordable childcare.

The incidence of aggravated assault doubled during the pipeline period. Burglary, larceny and vehicle theft all increased significantly. There was also a large and visible influx of prostitutes, pimps, drug dealers and users.

Alcohol purchases in Fairbanks increased 43 percent from FY1973-74 to 1974-75 with a probable impact on crime (Dixon 1978). Figure 5 shows the dramatic rise and subsequent decline in liquor sales at downtown Fairbanks bars during and after the construction period.



Source: FNSB, Community Information Quarterly, 1980.

Figure 5: Gross sales for downtown bars, 1973-80

Criminal homicide did not increase during the pipeline. It was expected that rape would increase during pipeline construction and while it is true that the rate of reported rape did not increase it is impossible to say what the true rate of rape was influenced by the large influx of prostitutes, a population that is both highly vulnerable to the crime of rape and highly unlikely to report it.

Crime	1973	1974	1975	1976	Change
Prostitutions & Commercial Vice	2	16	68	46	2200%
Stolen Property	2	2	8	24	1100%
Weapons	34	67	142	101	197%
Disorderly Conduct	123	244	354	293	138%
Liquor Laws	108	186	123	221	105%
Runaway	99	173	234	194	96%
Forgery & Counterfeiting	29	16	33	51	76%
Bomb Threats	8	5	10	14	75%
Embezzlement	17	21	15	29	71%
Driving Under the Influence	159	197	261	253	59%
Vandalism	215	251	386	340	58%
Suicide	3	1	1	4	33%
Assault on a Police Officer	15	57	55	19	27%

Crime	1973	1974	1975	1976	Change
Fraud	46	62	83	55	20%
Sex Offenses, except rape and prostitution	30	57	50	33	10%
Interfering with a Police Officer	8	6	33	8	0%
Arson	20	17	19	19	-5%
Non-Aggravated Assault	235	263	317	189	-20%
Narcotic Drug Law Violations	182	276	221	127	-30%
Missing Persons	103	81	125	69	-33%
Offenses Against Family and Children	36	28	22	21	-42%
Minor in need of Supervision	51	43	31	28	-45%
Kidnapping	2	2	3	1	-50%
Attempted Suicide	29	25	17	4	-86%
Drunkenness	230	540	173	0	-100%
Gambling	13	3	2	0	-100%
Defrauding an Innkeeper	----	16	31	15	N/A

Source: Sue Fison, Impact Information Center, Final Report

Table 4: Summary of Part II offenses, Fairbanks Police Department, 1973-76

Emergency services. The surge in emergency ambulance and fire calls in the City of Fairbanks is shown in the following table. During TAPS construction both fire and ambulance calls more than doubled over a three-year period.

Year	Fire Calls	Ambulance Calls
1972	388	1343
1973	373	1466
1974	479	2150
1975	912	2867
1976	954	2557
1977	831	1972
1978	698	1655
1979	746	1363
1980	827	1117

Source: City of Fairbanks

Table 5: Emergency calls, City of Fairbanks, 1972-80

The sharp rise in emergency activities roughly mirrored the growth in the city's population, as shown in Figure 6.

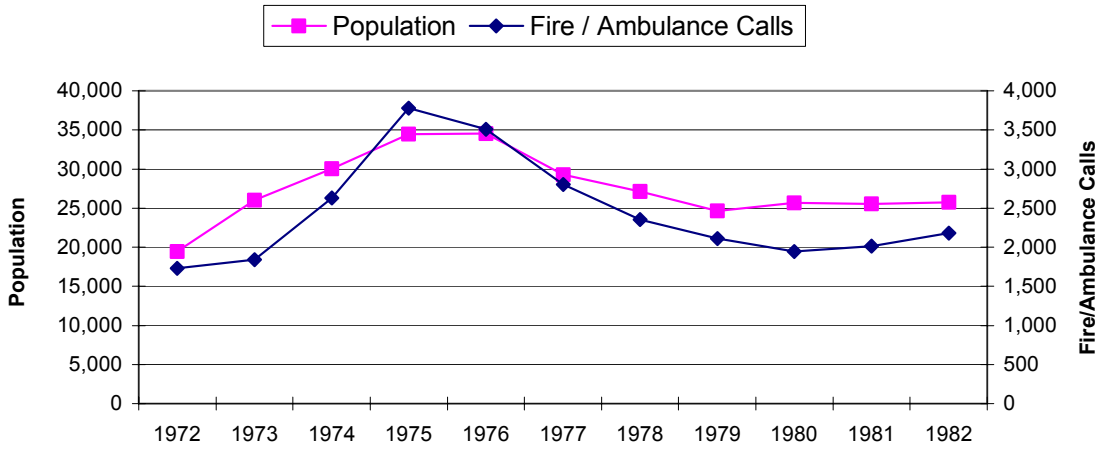


Figure 6: Fairbanks population and fire/ambulance calls

Part of the increase in emergency calls can be explained by the increase in auto accidents and injuries that resulted from increased traffic on area roads.

	1973	1974	1975	Percent change
Number of Accidents	1,149	1,366	1,906	66%
Number of Persons Injured	179	203	353	97%

Source: Dixon, 1978.

Table 6: Auto accidents and injuries in Fairbanks, 1973-75

Education. Planners in Fairbanks expected 3,300 to 3,900 new K-12 students to enter the public school system. Plans were made, high schools began operating in shifts and new buildings were built. The extra students never materialized. This turned out to be a fortunate mistake for the residents of Fairbanks since school facilities were already overcrowded and the people had failed to approve any school bond in several years. The largest portion of imported workers was between ages of 20 and 29 and most did not have children; those who did had younger children who were not of school age.

According to a 1977 report by Sue Fison, of the 25,673 newly hired pipeline workers, only 549 new children were expected to migrate. Reasons for the low number included: lack of housing, high cost of living, remoteness of camps, long working hours and nationwide news reporting the housing shortage, high cost of living, and high crime rates in Fairbanks. These factors together with the long and cold winters kept many workers' families away. In the school year 1974/75, high school enrollment decreased by 20 percent. High school students were leaving school to work at positions in town that were vacated by pipeline workers, and sometimes the students left school to work on the pipeline itself. From August 1974 to December 1975 only 1 of every 97 persons hired to work on the pipeline brought family to Alaska. Of the children who did come to Alaska during the pipeline 82 percent were school age.

During construction of TAPS, available figures indicate less than two percent of the construction workforce had school-age children in Alaska. This did not match expectations for significant growth in school enrollment. Keep in mind, Fairbanks high schools were crowded before construction began. Pipeline workers probably added some children to the FNSB school-age population. Some indirect and induced increase also can be attributed to pipeline construction.

However, an apparent surge in Fairbanks school enrollment, from 8,879 in 1974 to 12,585 in 1975, as shown in the chart provided by the school district, primarily reflects something other than pipeline construction. In FY 1976, the FNSB school district added military dependents attending on-base schools to the total enrollment for local schools. Schools located on the two military bases within the FNSB previously had not been included in the school enrollment count.

Students from military families account for at least 3,000 and probably closer to 3,400 of the 3,706 student increase shown for 1976. In the 1973/74 school year, 3,127 students attended school on Eielson AFB and Fort Wainwright (Community Research Quarterly, Fall 1987). No subsequent breakout of on-base school enrollment could be located. However, the 5,523 uniformed military personnel in the area in 1975/76 had 7,003 family members with them (Community Research Quarterly, Spring 1987), so an estimate of over 3,000 school-age children appears to be appropriate.

Dixon (1978) reported that only one pipeline construction worker of every 97 brought a family to Alaska. Because Fairbanks, the community at the center of construction activity, reported a school population increase of less than one percent, Dixon argues against planning significant education impact during gas pipeline construction.

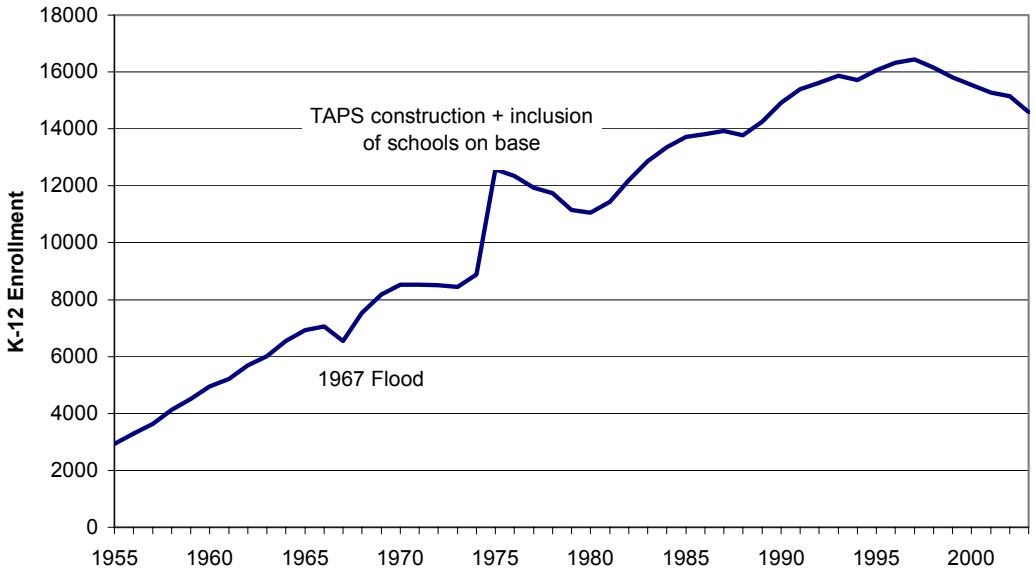


Figure 7: Enrollment in Fairbanks North Star Borough schools, 1955-2003

Health care. During pipeline construction, significant impacts on health care shaped the future of health care delivery in Fairbanks. The influx of people produced more doctors

in the Interior, brought specialists, increased pressure on the Fairbanks Memorial Hospital and led to the availability of more medical procedures being offered within the state.

The most obvious hospital impacts occurred in the emergency room:

- With no regular health care provider, many outsiders utilized the emergency room for routine medical care.
- The emergency room was thrust into the position of acting as a detoxification center for Fairbanks.
- From May 1, 1975 to April 30, 1976 there were 1,283 medical emergencies sent to the Fairbanks Memorial Hospital from pipeline camps. During this one-year period there were an average of 3.5 medical evacuations from pipeline construction camps per day.

In the decade before the pipeline, there were two clinics in Fairbanks, and all the doctors in town were working for one or the other. Doctors at the clinics were compensated with both a regular salary and a portion of the clinic's profits. Because of this compensation structure there was a lot of pressure to keep patients from going to the "other" clinic for services for fear that they might become regular customers there. If a patient had a malady for which there was a specialist at the competing clinic, the patient was routinely referred to doctors in Seattle rather than across town. Routine referrals to Seattle set up what was to become common for Alaskans: going Outside for anything other than basic health care.

In 1968, there were 27 physicians in Fairbanks representing eight specialties. In 1973, in anticipation of the pipeline boom, the clinics increased staff in Fairbanks to 40 physicians representing 10 specialties. By 1976, that number had swelled to 57 physicians and 12 specialties. Of these 57 physicians, more than one third practiced independent of the two original clinics. The clinics got large contracts to perform pre-employment physicals for the unions supplying the pipeline workforce.

Revenue to the health care industry from pre-employment physicals averaged $1.2 million a year during construction. With the clinics busy providing for potential pipeline workers, the independent doctors were available to serve the local resident population. Additionally, the two-clinic system that had stymied development of the health care industry in Fairbanks no longer dominated the scene. Specialists began to treat patients locally, the hospital added capacity and a more mature health care system was born in the Interior.

Social services. The local Salvation Army and Rescue Mission in Fairbanks saw dramatic increases in utilization as both a place to sleep and a source of meals. In 1974 the Salvation Army provided 3,773 nights and 9,890 meals. That same year the Rescue Mission provided 9,795 nights and 17,624 meals. By 1975 the number of Rescue Mission service recipients had swelled to 18,823 nights and 30,627 meals. The high cost and extreme shortage of housing added to the numbers of people receiving services.

There was not, however, the feared inflow of poor people and their families who would come to Alaska seeking jobs and end up on welfare. There was a 90 percent decrease in

food stamp cases between January 1973 and January 1976; public assistance cases decreased 36 percent during that same time.

Two important populations that were not able to reap the benefits of pipeline impacts were the very young and the elderly. These populations also had the most to lose from the social changes and dramatic inflation that occurred in Fairbanks during the pipeline. Elderly people on fixed incomes are unable to adapt to changes in costs of goods by picking up additional work or negotiating a new salary. In 1975, yearly income was less than $3,600 for 31 percent of elderly individuals, and 53 percent fell into the category of having yearly income below $6,000.

Young children were negatively impacted due to a severe shortage in childcare. Parents would often work 10 to 12 hours a day, and childcare was extremely hard to find, leading to an increase in child neglect. A survey conducted in Fairbanks (Kruse, 1977, ISER) found that 52 percent of female respondents who had children used a babysitter in the sitter's home for childcare; another 20 percent used their spouse.

People with physical and social disabilities are also among those who were not able to fully benefit from the economic activity that the pipeline brought to Fairbanks. It was, however, possible for people who experience disabilities, along with women and teenagers, to fill some of the in-town positions that had been vacated by people going to work on pipeline jobs. Much like factories in World War II, with the most desirable workforce otherwise occupied, opportunities for a previously overlooked workforce abounded.

Housing. A severe housing shortage struck Fairbanks, and the city scrambled to find an answer to the problem. In May 1975 Fairbanks had a 0.5 percent vacancy rate, down from a vacancy rate of 7.2 percent in September 1973. Increased demand drove up rents. Many anecdotal stories indicate ridiculously high rents – sometimes doubling in mere months – requiring some tenants to move out of their homes or take on additional work. The city worried that shantytowns would spring up; this did not happen but there were many residents of the Interior city who were living in sub-standard housing. Prior to pipeline construction there had been very little in the way of investment in infrastructure development that could have helped to avoid or minimize the housing shortage in Fairbanks. Individuals, businesses and government were wary of investing in housing facilities for fear that there would not be adequate demand to make it worthwhile. By the time it was painfully obvious to all that there was more than enough demand it was too late.

One factor that made it difficult for the community to rapidly respond to the demand for housing was the absence of commercial lenders in Fairbanks so all investment had to be private and/or come from outside Alaska. The vast majority of skilled trades-people were employed on the pipeline. Additional factors that impacted housing were the short construction season and the extended logistical time necessary to get materials to Alaska.

The housing shortage led to price gouging in both rents and selling prices for houses and property. One solution was to import pre-fabricated trailer homes: from 1974 to 1976 the number of mobile homes in Fairbanks increased from 2,237 to 3,482 and represented 49 percent of all new housing in the borough.

Transportation. Fairbanks lacked adequate transportation infrastructure to support a major industrial development project combined with a sudden, large increase in population. Traffic congestion increased dramatically, and was not confined to major throughways. Road use, both in town and the surrounding suburban areas, closely matched the ups and downs of pipeline traffic volume. The state was left with the majority of the bill for repairing roads that were damaged by heavy industrial use. The following chart based on DOT/PF information demonstrates the impacts on all types of roads from the increased traffic generated during pipeline construction.

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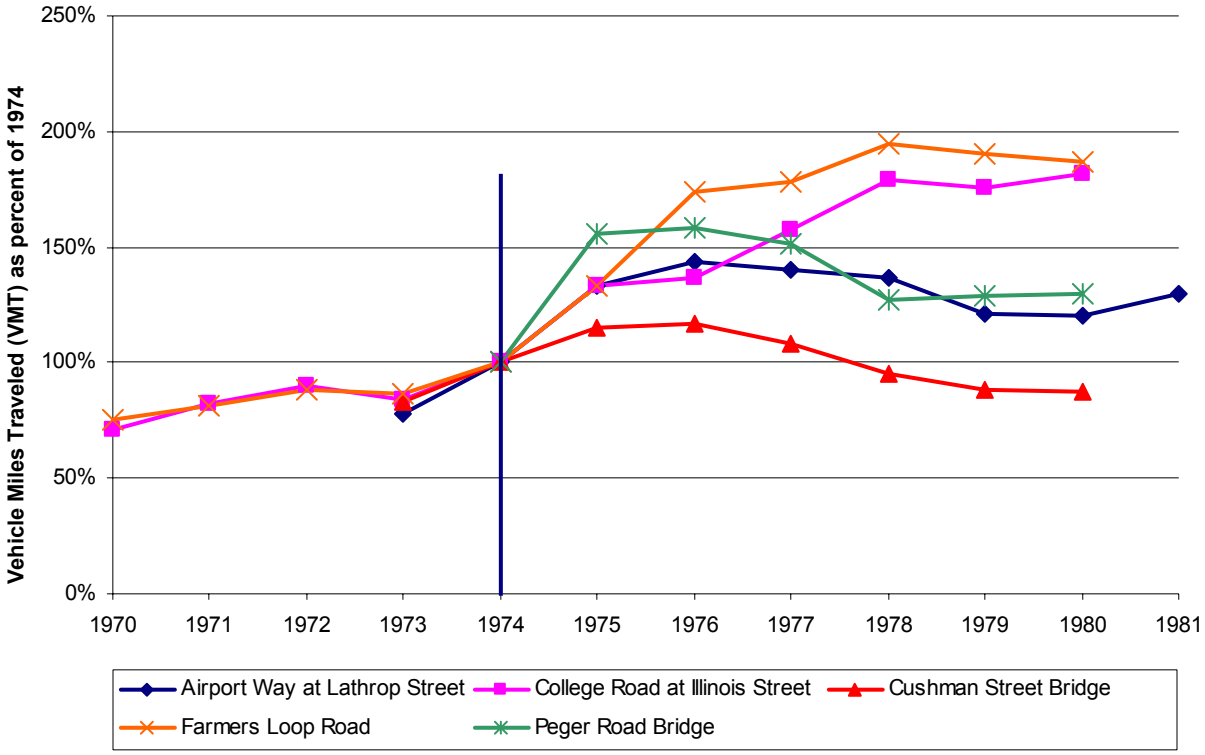


Source: Northern Region Traffic Data/Annual Traffic Volume Report

Figure 8: Increase in traffic on Fairbanks roads, 1970-81

Utilities. Use of electricity and water increased during pipeline construction. Increases in use came from residential users as population increased, and from commercial users as industry came to town. Pipeline operations ran in longer than normal shifts. Demand for utilities kept suppliers, particularly electrical suppliers, in a state of crisis management until GVEA added capacity in 1976.

Year	MKWH	Percent change
1973	206.1	8.59%
1974	231.6	12.37%
1975	298.7	28.97%
1976	305.5	2.28%

Table 7: Millions of kilowatt-hours of electricity sold in Fairbanks

Telephone service was severely impacted, as the Fairbanks Municipal Utilities System (FMUS) was unable to keep up with skyrocketing demand. New hookups were delayed indefinitely when "the system ran out of numbers" according to FMUS, requiring many to move to party lines for essential business and residential service. Overloaded circuits affected all individuals and businesses, as repeated busy signals slowed communications throughout the community

Cost of living. There was no Consumer Price Index (CPI) in Alaska except Anchorage during the pipeline period. The only record of increases in price comes from the Impact Center in Fairbanks, which reported costs for food 10 percent higher in Fairbanks than in Anchorage in October of 1976 and costs for non-food items 8.6 percent higher.

Between 1973 and 1975 average household income increased 59 percent for Alaska residents (Kruse, 1977), defined as those who were living in Alaska prior to pipeline construction. According to data provided by the Bureau of Economic Analysis, total yearly income for the city of Fairbanks increased 139 percent, going from $286 million in 1973 to $776 million in 1975. Per capita income rose by 149 percent from $6,011 to $14,991.

Year	Total Income	Percent change
1973	$286,449,000	7%
1974	$412,104,000	44%
1975	$776,009,000	88%
1976	$832,112,000	7%

Table 8: Change in total annual income in Fairbanks, 1973-76

Wage inflation and turnover. According to a technical report published by Minerals Management Service (MMS), professions with extremely high turnover resulting from the pipeline included public relations and security people; non-professional positions with very high turnover included food service, laundry, and cleaning people. Other low paying jobs such as retail were also impacted as these employees were able to move quickly into higher paying jobs in support service positions for pipeline workers and camps. This evacuation of low -skill and low -wage jobs opened them up to women, the disabled and young people.

During the construction period, it was possible for workers to job-hop on a fairly regular basis as the market was experiencing a shortage of workers. Pipeline paychecks also had the effect of forcing some organizations, including state and local government, to raise the wages they paid their employees in order to retain them.

The chart that follows demonstrates the difference in hourly wages for positions in town versus on the pipeline. The real difference in pay however is better shown in the second chart, where monthly wage data reveals the true difference in paychecks due to the overtime hours earned by pipeline employees who worked non-traditional shifts longer than eight hours per day.

Revenue impacts. The biggest jump in the Fairbanks population came between 1973 and 1976, when the borough population grew from 50,450 to 72,037, an increase of 43 percent. Over the same period, the tax base increased 63 percent. The January 1, 1973 total assessed value of property in the Fairbanks North Star Borough was $345 million. Two years later, on January 1, 1975 total assessed value had increased 77 percent to $610 million. Borough tax revenues increased 81 percent from 1973 to 1975. Both the city and the borough governments imposed sales taxes (two percent city and three percent borough) during pipeline construction. The sales tax, along with increases in property taxes, significantly increased the revenues realized by local government.

Social and perceived impacts. A survey conducted in 1977 (Kruse) provides the information on residents' perceptions of the most important community changes that resulted form the pipeline in the table below.

Category	Percent of total mentions
Increase in cost of living	30%
Overcrowding (in stores, lines and roads)	19%
Deterioration of the natural environment	12%
Scarcity of goods and services	9%
Improved economic conditions	8%
Increase in crime, hostility, distrust	8%
Change to more hurried lifestyle, more concern with money	5%
Physical growth of Fairbanks	2%
Little has changed	2%
All other changes	5%

Table 9: Perceptions of community changes in Fairbanks during TAPS

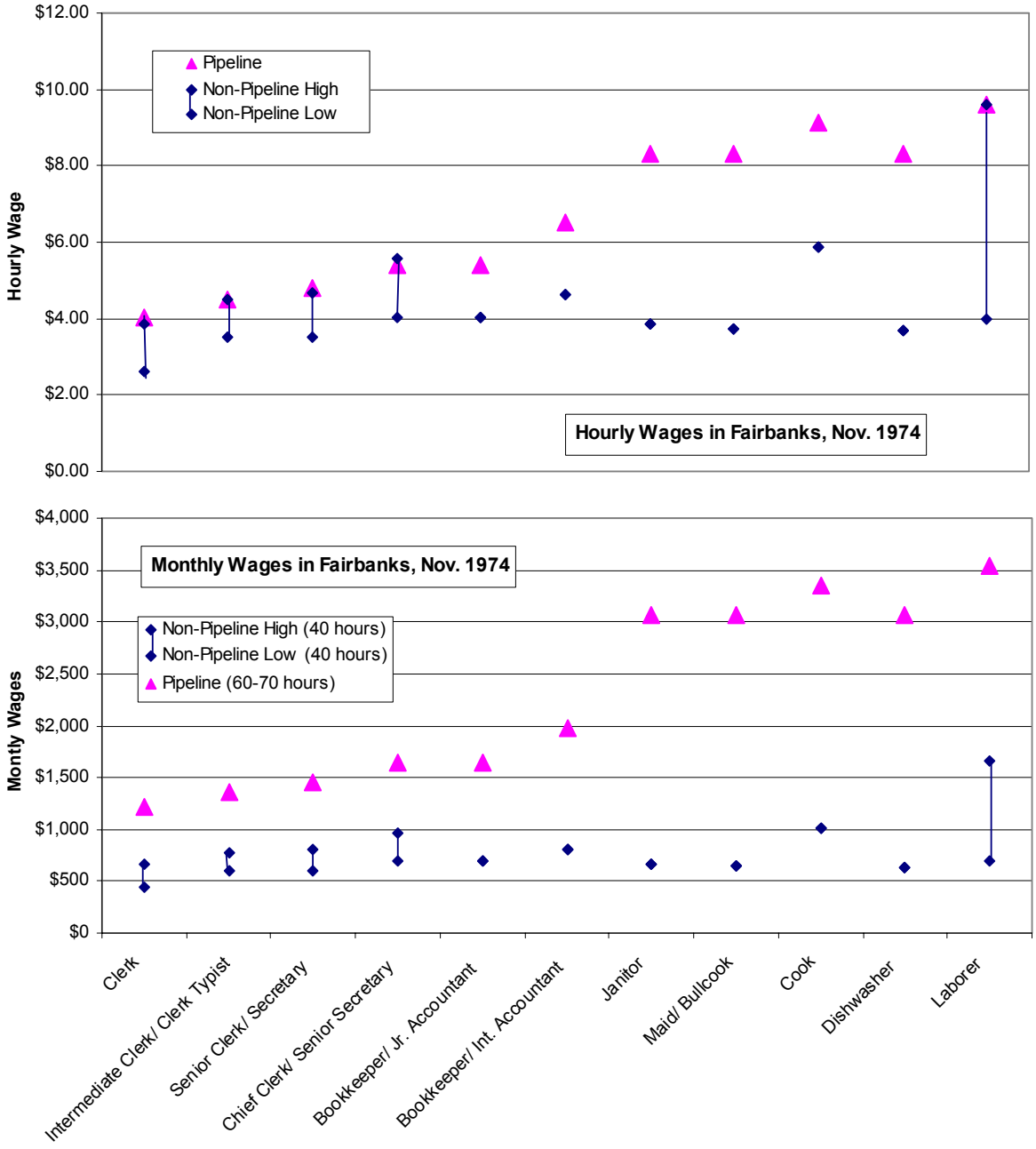


Figure 9: Comparison of pipeline and non-pipeline wage rates in Fairbanks

Impact planning. Fairbanks had already experienced a few significant boom-bust cycles in its relatively short history, so its residents had some idea of what sort of impact the pipeline project would have on the community. Despite this knowledge, the community was wary of putting too much energy and capital into preparations for the impending boom. Two key factors impacting planning were the lack of specific information regarding numbers of workers and timing of project approval and the desire not to waste resources in over-preparation. Some local business people had previously prepared for the boom and lost money when it didn't happen on the anticipated schedule.

There were a number of assumptions made when trying to predict impacts of TAPS that turned out to be inaccurate and misleading. The following are examples of incorrect assumptions made by those planning for TAPS construction in Fairbanks (Dixon 1978).

- *Rules and regulations concerning camp residency and other restraints will not keep people from bringing their families with them to Alaska*. In fact many people did not bring their families, many fewer than had been anticipated.
- *Family immigration will occur when people are more familiar with the area*. It does not appear, that after familiarizing themselves with the area and community, very many workers sent for their families.
- *Families of workers between miles 0 and 602 will be in Fairbanks; families beyond 602 will be in Anchorage and Valdez. The distance from camp to town will directly affect workers' habits and the frequency of their visits for goods and services*. As it turned out, those in camps farther away from Fairbanks were just as eager to get into town on their time off as those located closer to town.
- *People will travel the same amount regardless of the means of transportation, the direct correlation is between distance and frequency of visits*. In fact, people traveled more by road; if they had to fly they were less likely to go.
- *Fairbanks will receive major impacts of those on short-term leave; Fairbanks will lose out to Anchorage and the lower 48 in terms of impacts during longer furloughs*. In fact many people on longer furloughs stayed in the Fairbanks area.

When planners were trying to predict the behavior of the pipeline workforce they failed to look at similar workforces. Instead projections were made based on industries with older, more settled populations who are far more likely to be averse to the idea of being away from family and friends.

Lessons learned. On the subject of "what to do differently next time," Dixon recommended the following conditions for issuing construction permits:

- **Housing**: Stipulations regarding the percentage of housing that industry is required to supply to its employees; including the disposition of that housing after the construction period has terminated, may help avert a housing shortage and give the local community greater certainty about the future housing market.
- **Highway repairs**: Industry could be required to reimburse state and local governments for the cost of repairing roads and highways that experience inordinate deterioration due to industry traffic. Clear agreements should be hashed

out ahead of future development to determine who is responsible for the wear and tear on roads associated with heavy use and heavy loads.

- **Infrastructure cost sharing**: Industry could be required to bear some of the costs of expanding the infrastructure to meet its additional demands for communications, electricity, water, etc.
- **Employment regulations**: Stipulations with regard to employment of minorities, women and local residents, as well as forbidding discrimination, were included in the Trans-Alaska oil pipeline right-of-way agreements.
- **Industrial alcoholism**: Industrial alcoholism programs associated with massive construction projects may help improve safety records, as well as avoiding putting the responsibility for these problems on the local community.
- **Employee childcare**: A day care program for children of employees could attract more female employees, relieve stress on community resources, and minimize disruptions to children and families.
- **Car-pooling**: Industry initiated car-pooling or other transportation programs may reduce traffic congestion and air pollution.
- **Use of local volunteer organizations**: Industry should be discouraged from using local volunteer organizations. When the services of these organizations are used, they should be compensated through donations of money or other types of contributions. (i.e. no pipeline workers going to get free first aid certification provided by Red Cross)
- **Information sharing**: A stipulation forcing industry to gather and disclose information would assist in averting, ameliorating, or coping with social impacts. This could include information about the characteristics of the labor force, expenditure patterns in the local community, and industry plans and requirements with affect the local community.

THE TAPS EXPERIENCE IN VALDEZ

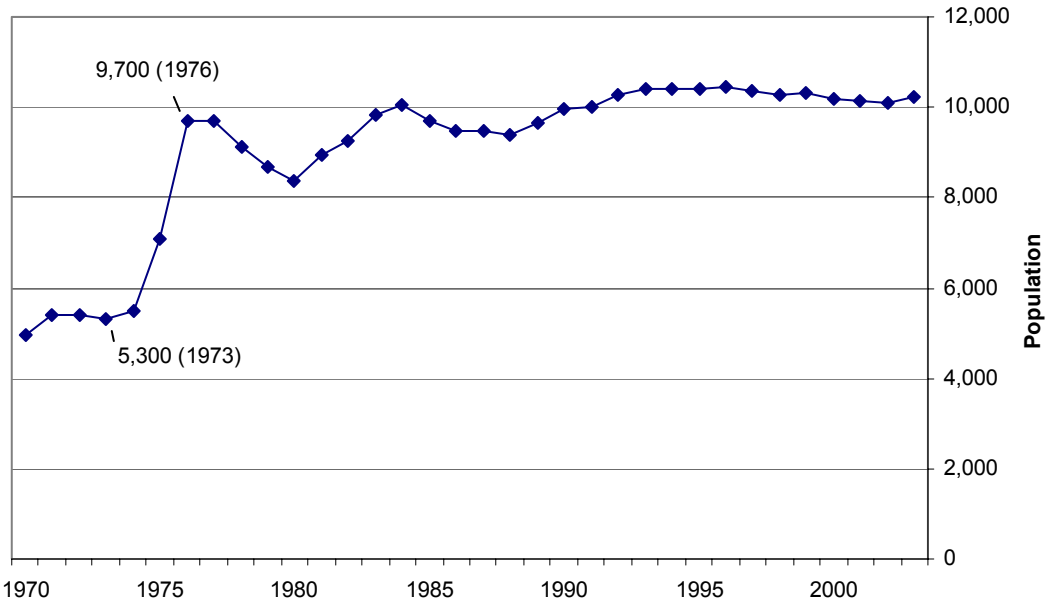
The port of Valdez is the terminus of the Trans Alaska Pipeline and the location of the 1,000 acre Marine Terminal, which cost $1.4 billion to build and employed 4,300 workers at peak construction. More so than Fairbanks, Valdez was unprepared in 1973 to absorb the population growth that accompanied TAPS construction and the significant impacts it placed on housing, schools, police and emergency services, utilities, roads, and social services. The community was small, consisting of 350 families in January 1974. Housing was at a premium even before construction began, and small town institutions and infrastructure—notably schools, sewer and telephone services—were not designed to meet the anticipated demand. Planning was held to a minimum for a variety of reasons.

An excellent resource that outlines the Valdez experience during TAPS construction has been conducted by University of Alaska Anchorage researchers' Dr. Michael Baring-Gould and Marsha Bennett (Baring-Gould, 1976). They surveyed forty percent of Valdez households selected in random samples in January 1974 and then repeated interviews in the fall of 1975. At that time they added an additional sample group representing families that had moved to Valdez since December 1973. A third, smaller group consisted of 61

randomly selected workers in pipeline camps. The following summary of their findings includes much of the historical data collected as part of the research project.[6] (The conclusions related to camp workers are more tentative due to the smaller size of the sample.) Little follow up was done after 1975, so the findings focus almost exclusively on impacts experienced during the first two years of TAPS construction.

Population. As in Fairbanks, impacts began early in Valdez, as soon as pipeline plans were revealed. Land speculation in the early 1970s—much of it by outside interests—tied up most of the land available for development. Many local businesses, including hotel, grocery markets, and hardware stores, were sold to out-of-towners, as well. Work on the pipeline project began before 1974 with pipe wharfing and coating. By December 1973, the population of the city had increased to 1,350, a 34 percent over 1970. The city's population peaked in July 1975 at 6,512, with 54 percent living in town and 46 percent living in the construction camps.

The huge influx of people caused a demographic shift in Valdez. At the peak of construction, eighty percent of the population consisted of working adults. Even without counting camp workers that category reached 69 percent by mid-1975. Children fell as a proportion of the total population. As many as sixteen percent of the families surveyed in 1974 had left town permanently by the next year due to other professional opportunities, a dislike of the boom town atmosphere, or because they could not afford the high cost of living.



Source: U.S. Census 1970-89, 2000; State of Alaska 1990-99, 2001-03

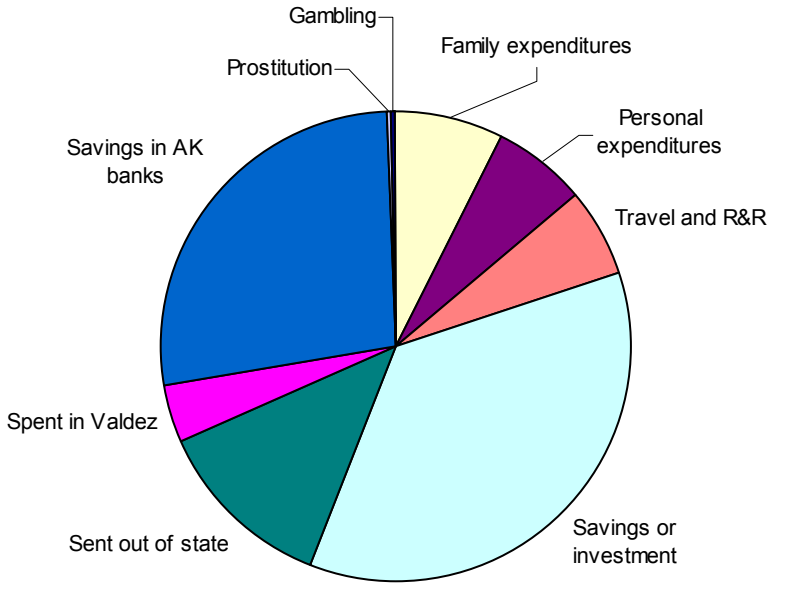
Figure 10: Population growth in Valdez-Cordova Census Area, 1970-2003

[6] Population and school enrollment data were acquired from other sources.

Labor force impacts. During TAPS construction, direct and indirect employment by Alyeska and its pipeline contractors climbed from 162 in May 1974 to a peak of 3,318 in October 1975. Four camps were built to house construction workers in and around Valdez. The largest camp was Terminal Camp, which housed 2,000 to 3,000 workers at peak construction and was located across the bay from downtown Valdez. The average age of camp workers was 32, and 59 percent were single. The camps included a higher proportion of Native Alaskans than in the general Valdez population. (In 1975, it was estimated that almost every local Native family had at least one pipeline worker. Many of these had formerly been unemployed or fished for very low wages.) Workers in the camps were heavy equipment operators, unskilled laborers, bull cooks, and others.

Although seventy-five percent of camp workers identified themselves as Alaskan residents, only 40 percent actually had state resident status at the time they were initially employed on the project. Forty-two percent had families living outside the state, and 30 percent sent a portion of their paycheck outside Alaska.

Gross monthly salaries averaged $3,900 with a net take home pay of $2,550. Contrary to public opinion, most workers had specific goals for saving their wages, and almost half of those interviewed in the fall of 1975 had set aside at least half of what they needed to meet their goals. Due to the long work hours and weeks and the self-contained nature of the camps, camp workers participated little in the Valdez community and spent little of their pay in town. The average camp worker spent a total of only four hours per week in town. The following chart shows how the average monthly paycheck of camp workers was spent.



Source: Baring-Gould, 1976.

Figure 11: Average monthly expenditures of camp workers, Valdez, 1975

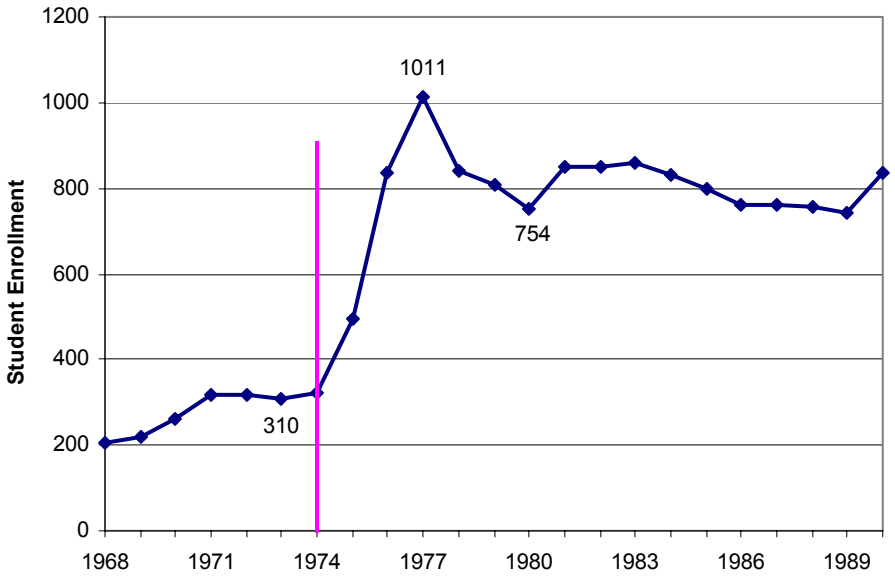
Aside from work camps, Fluor, a primary pipeline contractor, and Alyeska built a new subdivision outside of town for administrative personnel and other staff. Despite some social divisions that existed between this employer-defined sub-community and older neighborhoods, it is likely these professional workers and their families spent more time and money in town than did camp workers, and had a greater impact on the economy.

Turnover and workforce losses. TAPS brought about structural changes in the Valdez economy, which had been based predominantly on public employment in the schools, a state-owned children's hospital, and the state highway department. Valdez was also characterized by high seasonal unemployment in significant portions of the labor force, including trucking, construction and tourism. The fishing industry was in decline, and youth especially tended to leave town to look for opportunities. With TAPS, the local economy shifted to one based heavily on construction and management of the pipeline project.

The changes were due mostly to the influx of new workers, rather than conversion of the existing workforce. There was a low rate of job change among Valdez residents (those living in town prior to January 1974) holding professional, managerial or technical jobs. About 85 percent of workers in these occupations stayed with their employers, while 50 percent of the skilled or unskilled laborer workforce changed jobs. Local schools and the regional headquarters for the highway department saw little turnover. Local commercial establishments, Harborview Hospital and construction firms that were not primary subcontractors of Alyeska experienced higher turnover or workforce loss. In addition to service workers (including food service and orderlies), the greatest labor force losses occurred in the fishing industry. Overall, thirty percent of Valdez residents changed their place of employment between early 1974 and late 1975. Seventy-five percent of these took jobs on the pipeline project as managers, clerical staff or equipment operators, or in pipeline-related employment such as trucking. (Surprisingly, the proportion of the labor force listed as unemployed also rose; although, this increase primarily represented housewives who moved to Valdez with their spouses who took pipeline jobs. Thirty-one percent of new residents in the survey sample identified themselves as housewives.)

Income and wage inflation. In order to keep workers, employers, including city and state government, were forced to increase salaries to meet local conditions of inflation. Annual income of household heads more than doubled from $11,940 in 1973 to $24,500 in 1975. Median family income increased 86 percent from $16,430 to $30,600 over the same period. This increase was greatest among local residents who worked on the pipeline. Because pipeline workers came from lower-skilled, lower-paid jobs, TAPS had the benefit of equalizing incomes to some extent.

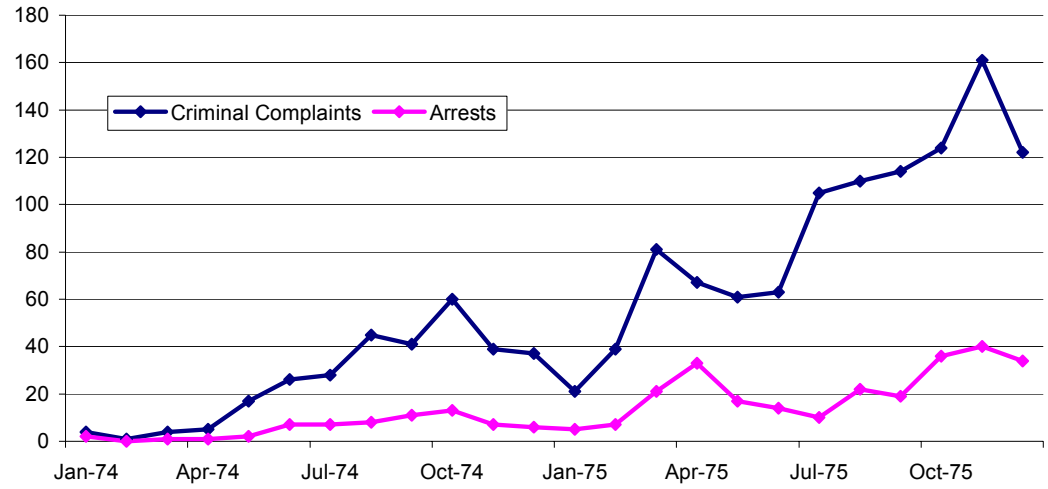
Education. Valdez failed to plan for the impact on city schools. In spring 1974, enrollment was already up by 50 students from the previous fall. By the time TAPS construction ended in 1977, enrollment had climbed 226 percent. Valdez school officials used a variety of strategies to get through the first year of impact, including double-shifting, the use of temporary classrooms in other community facilities, and temporary, modular units paid for with state impact funds. Bond elections in 1974 and 1975 authorized the expansion of elementary and high schools. Occupancy of the new elementary school took place in January 1975, twenty months after construction began.



Source: Valdez City Schools

Figure 12: Enrollment in Valdez City Schools, 1968-90

Emergency services. Valdez' ambulance service was kept busy during TAPS. Its monthly call rate rose from 3.6 calls per month from January to June 1974 to 14.3 calls per month for the same period a year later. The number of stress-related calls increased 143 percent, from seven calls in 1974 to 17 in 1975. (Stress related calls include those from heart attack, gunshot wound, drug overdose, alcohol-related events, and death. Not included are motor vehicle accidents, industrial accidents, and other routine calls.)



Source: Baring-Gould, 1976, from Valdez Police Department monthly reports.

Figure 13: Growth in criminal complaints and arrests, Valdez, 1974-75

Public safety. The city's police force increased from two to eleven during TAPS construction. Monthly crime reports show criminal activity increasing at a far higher rate than the growth in population. Steady increases were seen in larcenies, drunken disturbances and alcohol-related traffic offenses. Prostitution and gambling existed, but were given little publicity by local authorities. Figure 13 shows criminal complaints and arrests by the Valdez Police Department does not include data from the camps, which maintained their own security personnel.

Public utilities. While city officials and the public anticipated social problems such as crime and alcohol abuse, few foresaw the huge demand that would be placed on city services by a rapidly expanding population. The telephone system and sewage disposal services in particular became seriously overloaded during the first two years of impact. Due to the lag time in designing new systems and obtaining financing, utilities were not upgraded until significant disruptions in service were experienced. In January 1974, the city had only twelve phone circuits and 1,114 installed telephones. They added 32 more circuits and 4,262 phones in the next two years, but the system remained so overloaded that residents found it difficult to make either local or long distance calls. State impact money was eventually used to upgrade the water and sewer systems. However, the first stage of the expansion was not completed until late 1975.

Housing. The drastic shortage of housing was the greatest single impact problem in 1974 and 1975. Housing was already in short supply before construction began. This was partially the result of bureaucratic and legal restrictions imposed by the U.S. Department of Housing and Urban Development when the new town site was built after the 1964 earthquake. Once the population began to swell, low-cost housing became almost impossible to obtain. The impact fell mostly on new residents: prospective construction workers and their families, and new state and city personnel. As a result, in July 1974, over half the housing in use was substandard or temporary in nature. Ten percent of the population lived in campers or on boats, 41 percent in trailers, and eight percent in motel rooms, apartments or bunkhouses provided by employers. Construction of new and permanent houses became a luxury affordable only by a few, due to skyrocketing land values and inflated construction wages. Banks in Valdez, who were unwilling to give mortgages for conventional long-term loan periods, exacerbated the shortage.

The lack of community planning to address housing needs had several, significant consequences:

- Turnover in some state and city jobs was made worse when individuals, including school teachers and key medical staff, left town due to their inability to find adequate, affordable housing.
- Private contracts were made to supply Alyeska with land to build professional housing with utilities supplied by the company. The existence of neighborhoods based on employment created social divisions and led to animosity between groups with differential access to adequate housing.
- The construction of permanent housing was constrained, while temporary solutions proliferated.
- Planning and zoning decisions were guided by a short-term, crisis mentality rather than long range plans. In spite of zoning requirements based on a previous

comprehensive plan, there was an unwritten policy of tolerating exemptions to code to meet temporary but acute housing needs.

Revenue impacts. The assessed value of real property in Valdez, which was $1.1 million in 1974, tripled in value by 1976. City mill rates during the period ranged from 10 to 15 mills. Despite the increased demand for public services, the growth in property tax revenue allowed the city to discontinue its sales tax in 1976, along with water and sewer fees.

The city also received state impact money following the passage of special impact legislation in 1974. As of June 1976, Valdez had requested $12.1 million in impact money and had thus far received $1.6 million in discretionary grants. The grants were used primarily for the purchase of modular school units, other school expenses, temporary camper facilities, expansion of city water and sewage systems, and expenses incurred in taking over the general wing of the state-owned hospital. In addition, the city received a block grant of over $2 million in June 1974, which was used for the expansion of the police department and other city services, and for city shares of the sewer system expansion.

Impact planning. The lack of better planning to prepare for TAPS constructions impacts has been explained by several factors:

- A lack of support and financial assistance by the state prior to construction: the commitment of state monies for impact needs came only after the impact was demonstrated; when it did come, impact aid was less than anticipated.
- A lack of concern on the part of residents: Sixty-one percent of Valdez residents surveyed believed that "Alyeska would do what was best for Valdez."
- A lack of actionable knowledge from industry: Alyeska provided little concrete information on specific plans or needs.

Lessons learned. Researchers identified several lessons that other communities could take away from Valdez's experience during TAPS construction:

- Communities should be encouraged and supported to develop short-term plans for impact period;
- Unless short-term planning is clearly distinguished and coordinated with long-term planning, political pressure from impacts will demand compromise of any long-term planning efforts;
- There is a definite need for state and federal agencies to facilitate planning in communities prior to construction of major project. In Valdez, services should have received anticipatory funding based on project demand to prevent disruption of service;
- There is a need to establish a funding policy to subsidize local planning prior to impact;
- Greater specificity is needed in plans from all impacting industries. Plans for the various services needed by industry during all phases of the project, including schools, housing, utilities, recreation, and other basic services, should be estimated and given to the community for planning process.

THE TAPS EXPERIENCE IN INTERIOR VILLAGES

The Rural Impact Information Program (RIIP) was established in March of 1975 to monitor the impact of the TAPS construction on the people and communities of rural Interior Alaska. The results of that monitoring effort were reported in a series of publications issued by the program. The following general conclusions regarding pipeline impact on rural communities appeared in the the program's final report, which was released in 1977.

Population. Highway communities in the Interior grew rapidly during the pipeline period. Population increases of several hundred percent were not uncommon. Hub communities in non-highway areas also grew but not to the same degree. Most non-highway villages maintained stable populations.

Labor force impacts. Over 5,700 Alaskan Natives were employed in the construction of the Trans-Alaska Oil Pipeline; they comprised almost ten percent of the total workforce on the project. Natives in the Interior did particularly well, filling a total of 4,817 jobs.

A comparison of results of surveys of the rural Interior workforce before and after the pipeline shows an increase in job skills and union membership because of pipeline work experience. However, unemployment rates in rural areas currently appear to be reaching pre-pipeline levels.

Cost of living. Food and housing costs generally rose in the rural areas of the Interior but not as rapidly as Fairbanks' costs. There was a wide variation in food price increases in villages because of changes in amounts purchased and transportation costs.

Loss of community manpower. All Interior communities experienced manpower shortages to some extent. The smaller villages felt the most severe impact where few people were qualified to take over for essential personnel who left for pipeline jobs.

Utilities. Poor communication facilities in the bush hindered the employment of rural residents since they could not always be contacted in time to take advantage of available jobs. The facilities were not until the pipeline project was almost complete.

Transportation. Both scheduled and chartered flights to rural communities increased during the pipeline period. Smaller aircraft were in use because Wien Airlines subcontracted most of its bush flights in the Interior to smaller air carriers. This led to problems with village freight deliveries, particularly large items such as snowmobiles.

Impact planning. The efforts to document pipeline impact were frequently hindered by lack of available information on changing conditions in the villages. Not only was little known about conditions prior to the pipeline but state agencies often kept records in such a way as to make it difficult, or impossible to determine what was happening at that time. RIIP staff found it necessary to devote much of their time to researching the availability of services and facilities in each of the communities in the Interior. This research resulted in the publication of a *Community Facilities Summaries* (October 1975; revised, June 1977), but the time spent on that effort reduced the program's ability to thoroughly investigate pipeline impact. Out of necessity, the Rural Impact Information Program became more of a "rural" than an "impact" information program.

State wealth sharing and impact assistance. In 1971 the state began an ambitious program of facilities construction and increased services with revenue provided by the oil lease sales. Rural areas appear to have shared in the benefits of that program. However, per capita state expenditures decreased during the actual construction of the pipeline because of the large increase in the state's population. Specially appropriated impact funds were directed towards communities experiencing population growth as a direct result of pipeline construction.

Lessons learned. RIIP made the following recommendations for future large development projects:

- Data on conditions in rural communities should be gathered and published on a regular basis, not just during impact periods. Adequate planning for impact situations is impossible without an understanding of existing conditions. A meaningful analysis of impact is impossible without baseline data with which to make comparisons.
- State record keeping should allow retrieval of information relating specifically to rural areas. Most state departments currently divide the state into regions containing at least one urban area, and regional reports make it impossible to differentiate between statistics for rural and urban areas.
- State departments should monitor the demands made upon their services as a result of impact and should evaluate the adequacy of their response to those demands. The monitoring effort should continue throughout the impact period and should not be limited to providing justification for increased budgets.
- Impact assistance in the form of grants or loans should be provided to communities early enough to allow for adequate planning and preparation. Funding should be continued throughout the impact period so that an evaluation process can be maintained and the accuracy of projected impacts can be confirmed or denied.
- Increase in population should not be the only criterion for determining a community's need for impact assistance. Some communities that do not experience population growth nonetheless experience indirect impacts such as loss of valuable manpower. Assistance to these communities might take the form of training of additional members of the community in vital skills so that the loss of one resident does not endanger the delivery of a community service.
- Planning for vocational training programs should be based upon a manpower skill survey of the resident population and an accurate assessment of manpower needs on the project. Training should begin early enough to allow completion of a course before actual work on the project begins, and the skills taught should be transferable to other jobs.
- A special effort should be made to provide rural communities with information on jobs and business opportunities resulting from the new development. Of particular importance are procedural manuals for joining unions and obtaining training and employment assistance.
- Employment and training assistance programs should be coordinated to avoid duplication of effort and to make maximum use of existing services and facilities.

- State regulated services such as transportation and communications should be monitored to ensure that services to rural areas are not curtailed because of new commitments to large industrial development projects.

Additional TAPS impacts on rural communities are discussed in the section on Subsistence and Socio-cultural Impacts.

THE TAPS EXPERIENCE IN DELTA JUNCTION

Delta Junction was included in the RIIP study, and the municipality experienced many of the general impacts described above. Not only was the community in the direct path of the pipeline, Delta Junction was adjacent to a pipeline camp and the community grew rapidly. The following specific impacts were noted by RIIP:

Population. Delta Junction experienced a 27 percent increase in population (from 703-892) between 1970 and 1975.

Emergency services. The only municipal service provided prior to the pipeline was fire protection. According to RIIP, Delta Junction's fire protection area increased in population 157 percent between fiscal years 1974 and 1976.

Perceived impacts. Delta Junction was the only rural community in the Interior to receive a direct State Impact Assistance grant to fund additional services and facilities related to pipeline development. The $379,000 in grant money the municipality received established a two-man police force, increased the size of the fire department, and paid for the services of a city administrator and a city clerk. However, community tax support was necessary to continue these services, yet tax referendums were voted down on three separate occasions. As a result, the additional services were not available during the last two years of construction. Based on the experience with the direct grant, Delta did not apply for the discretionary grants made available to communities in cases of "extraordinary pipeline-related municipal and educational operating expenses that could not be met through normal increases in local revenue. "

In addition, Delta Junction area residents have made the following anecdotal observations concerning municipal impacts of TAPS construction:

- Increased traffic resulting in increased pressure on police, health care and emergency services.
- Increased alcohol and drug use resulting in increased pressure on police, social services and health care.
- Increase in school age populations resulting in strains on school district services.
- Increased road use resulting in deterioration of road systems.
- Increased wages and salaries resulting in pressure on local governments to increase personnel budgets to attract and retain qualified employees.
- Overbuilt residential and commercial sector resulting in a dramatic drop in real estate values after completion of construction.

SECONDARY AND POST-CONSTRUCTION IMPACTS

The Municipality of Anchorage and other communities further removed from the pipeline corridor experienced more secondary than direct impacts from TAPS, but the impacts were significant nonetheless. Anchorage served as a headquarters for pipeline administrators and support industries. It grew dramatically in population during construction, and it attracted a large share of the state's oil-tax dollars in the boom that followed. The impact of TAPS was felt on the local economy, municipal infrastructure, education expenditure, property values, housing, transportation, utilities, and public services. Because the effects were primarily indirect and induced, it is difficult to separate actual effects of pipeline construction and operation from those caused by general population increase, state regulatory policy, and oil-funded state largesse.

A study of the *Social and Economic Impacts of the Oil Industry in Alaska*, *1975 to 1995* by the McDowell Group, Inc. examined these impacts on Anchorage, the Kenai Peninsula Borough and the Northwest Arctic Borough, and showed the impacts of both the oil boom and the bust on municipal infrastructure development and the delivery of municipal services to be considerable in Anchorage especially, and in the other communities to a lesser extent.

The oil pipeline construction was not the only factor fueling population growth in Alaska in the mid-1970s. TAPS construction came at a time when a recession in much of the rest of the country made the lure of a booming Alaskan economy even stronger. As a result, in-migration was probably considerably higher than it would have been if TAPS had gotten underway during a period of more robust economic growth in the Lower 48.

In Anchorage, population increased 20 percent over the four-year period from 1973 to 1977, from 147,300 to 177,000. Over the same time period, the Kenai Peninsula Borough grew 35 percent, from 15,900 to 21,400, while the Valdez-Cordova census area recorded a phenomenal 83 percent growth, from 5,500 to 9,700. It is difficult to distinguish how much of this growth was due to direct or indirect employment relating to TAPS construction, and how much can be considered induced or unrelated to the project. Moreover, in many communities the TAPS-era population changes were dwarfed by the growth experienced shortly thereafter during the 1980 to 1985 economic boom that was fueled by high oil prices and increased state spending. Table 10 shows growth rates during and after TAPS construction for select communities.

As the table indicates, the impacts of the pipeline did not end with the end of construction and the first barrel pumped. Communities throughout the state were affected both positively and negatively by the oil wealth that the pipeline generated and by how that wealth was spent. State oil revenue increased from $230 million in 1975 to $5.7 billion by 1982 (both in 1995 dollars). Both the price of oil and the number of barrels produced roughly doubled from 1978 to 1980, providing the state with unprecedented revenue and development opportunities.

	1973 population (U.S. Census)	TAPS Construction (% change in population: 1973 to 1977)	Oil Boom (% change in population: 1980 to 1985)
Municipality of Anchorage	147,300	20%	30%
Fairbanks North Star Borough	47,700	38%	32%
Haines Borough	1,700	0%	37%
Kenai Peninsula Borough	15,900	35%	49%
Matanuska-Susitna Borough	8,400	51%	109%
Southeast Fairbanks Census Area (includes Delta)	4,600	11%	26%
Valdez-Cordova Census Area	5,300	83%	16%

Source: U.S. Census; NSB Planning Department, FNSB Planning Department, Alaska DOLWD

Table 10: Population growth during TAPS construction vs. the "Oil Boom"

State oil revenue helped fund the new schools required to keep pace with the growing population through the school debt reimbursement program that left boroughs and municipalities with little bonded debt. According to the McDowell Group, municipal debt was much lower than would normally be the case with the rapid expansion of schools and other facilities. State oil revenue distributed to local governments took the place of issuing debt. The State subsidized electrical generation for rural consumers. Oil revenue funded capital construction projects throughout the state, strengthening and prolonging both the construction boom begun by the pipeline and the demand for housing it created. Oil revenue also made it possible for the State to offer below market mortgage rates, further increasing demand for housing despite the rising market. With rising property values, Anchorage and other communities saw tax receipts swell and expanded municipal services.

The housing boom lasted until 1985. The statewide full value of assessed real property (in 1995 dollars) reached a peak in 1986 of $38.2 billion, which was almost double the real value of all property in Alaska before the boom began in 1979. Following the crash, the total value of assessed real property in Alaska fell 40 percent in three years in nominal dollars. In real dollars it fell almost to the level it was before the boom began. In Anchorage, assessed property values rose from $2.4 billion in 1975 to a high of $16.8 billion in 1986, before falling to $9.0 billion million by 1988 and bottoming out at $7.8 billion in 1990. In the Kenai Peninsula Borough, property values climbed from $272 million in 1975 to $3.0 billion in 1986 and reached a low of $2.3 billion in 1991.

Year	Municipality of Anchorage		Kenai Peninsula Borough		Statewide	
	($ Millions)	(1995 dollars, Millions)	($ Millions)	(1995 dollars, Millions)	($ Millions)	(1995 dollars, Millions)
1975	$2,422	$6,140	$272	$690	$4,332	$10,980
1980	$6,474	$10,798	$1,524	$2,541	$12,553	$20,936
1986	$16,809	$21,285	$3,046	$3,857	$30,201	$38,243
1991	$8,276	$9,353	$2,308	$2,608	$18,710	$21,145

Source: Alaska Taxable, various years.

Table 11: Full assessed value of real property, Anchorage, KPB and Alaska.

When the price of oil collapsed in 1986, state oil revenue dropped nearly in half, contributing to (if not causing) the recession from 1986 to 1990. According to the McDowell Group, the collapse in oil revenue "pushed the real estate market over a cliff," but the market had been overheated and clearly due for a correction. The construction industry had been building at an unsustainable rate, as evidenced by the fact that Alaska had practically doubled its private capital stock in seven years. Total housing units increased from 154,171 in 1980 to 232,608 in 1990. The state's housing policies exacerbated both the boom and the bust in the construction industry.

The recession caused structural changes to the economy. The construction workforce, which was dominated by young, single males with high incomes, was cut in half over a very short period. Unemployed construction workers tended to leave the state rather than work in other industries, contributing to the real estate crash. Many Alaskans saw the real value of their homes and commercial properties fall well below the balance on their mortgage; many simply walked away from these devalued properties. Foreclosures reached an all time high. Residential construction companies and some lending and mortgage insurance institutions went out of business.

With its strong industrial tax base, the Kenai Peninsula Borough was not as severely impacted as other local governments despite steep declines in residential property tax revenues. As a second-class borough, its only major services are education and roads, and bonded debt was low due to the state's school debt reimbursement program.

According to the McDowell Group's study, the unspoken assumption is that if the oil boom and bust begun with TAPS construction were to repeat itself now, the effect on the State and municipal and regional economies would not be so cataclysmic. Although some sectors of the state economy such as timber and fishing have declined, other sectors, including tourism and the service economy, have grown, and the economy as a whole is not as dependent on oil and construction as it was during the boom years.

The charts on the following page illustrate how TAPS construction, followed by eight years of unprecedented, oil-fueled state spending contributed to population growth throughout the state.

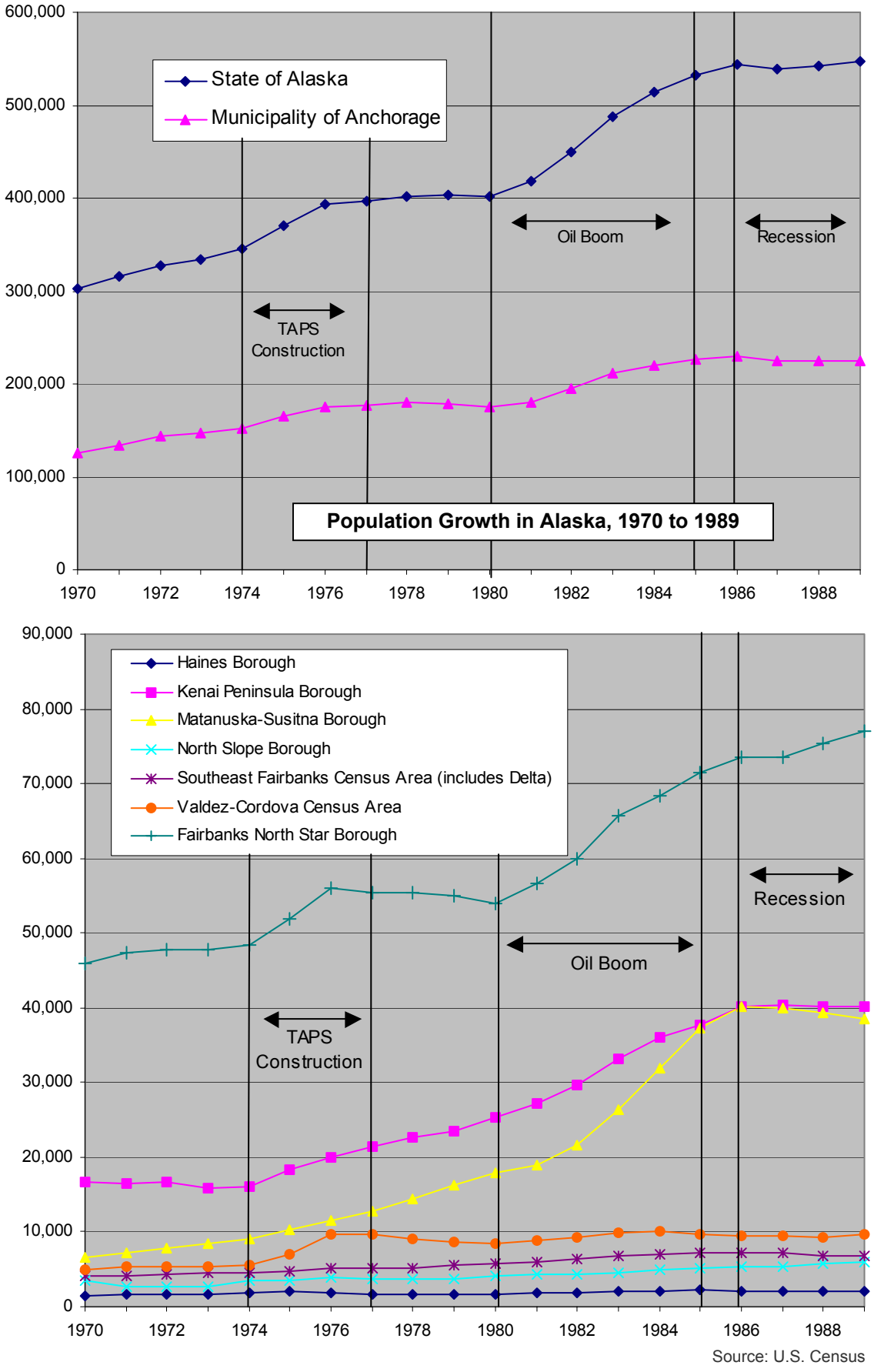
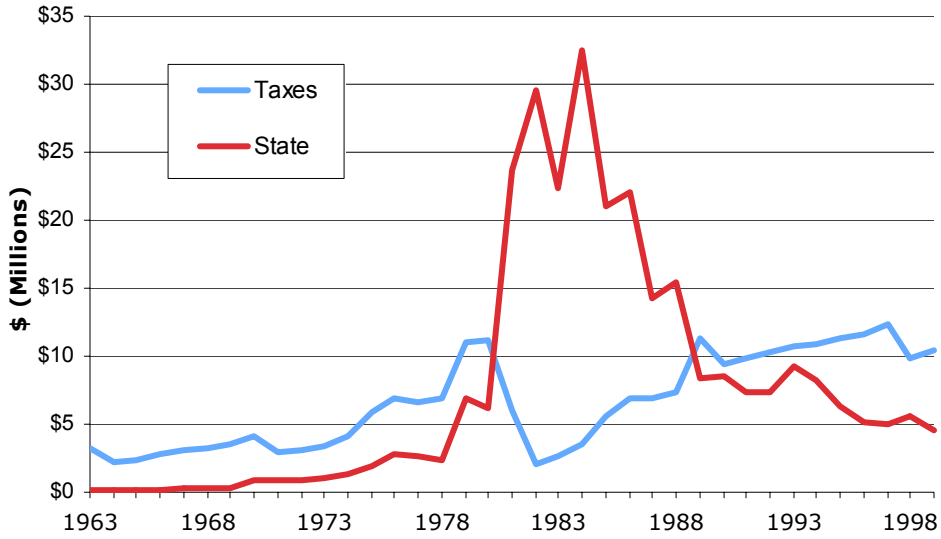


Figure 14: Population growth in Alaska, 1970-89

REVENUE IMPACTS FOLLOWING TAPS CONSTRUCTION

Local governments received significant budgetary boosts from the State of Alaska once oil started flowing. Many municipalities repealed or reduced taxes on individuals and businesses. The state embarked on significant spending increases for operations beginning in 1978, and for capital projects in 1980. This state spending helped local governments recover from the impacts of pipeline construction on public services and infrastructure. The state shared significant revenues with municipalities in the early 1980s, but reduced municipal assistance and revenue sharing as state revenues began to decline in the late 1980s. The following figure, showing City of Fairbanks tax and state revenues, is typical of changes seen by local governments following pipeline construction.



Source: City of Fairbanks, Comprehensive Annual Financial Reports, 1970, 1980, 1990, 2000

Figure 15: City of Fairbanks revenue sources, 1963-2000

As noted elsewhere in this report, the presence of the Trans-Alaska Pipeline System brought other impacts to Alaska, and Alaska's municipalities. The direct impacts on municipalities of pipeline operations and maintenance are similar to the impacts of other business and industrial activities. The cumulative impacts of oil and gas development on Alaska's North Slope, and the impacts of catastrophic events on the Prince William Sound and nearby coastline, have been transforming events. There is still no experience in dismantlement and removal of a major pipeline, or in restoration of the affected area. The EIS for the gas pipeline will need to anticipate and address the impacts of these and other potential transformative events on Alaska, its people and municipalities.

IV. Alaska Municipalities

MUNICIPAL STRUCTURE

Alaska's Constitutional Convention, in providing for the legislative, executive, and judicial branches of government, dealt with a subject matter with which they were familiar and on which they had definite opinions.[7] There was little relevant Alaska experience with local governments, simply because of its vast geographic expanses and varied population densities. Constitution delegates believed a new and different system for local government should be established. According to convention delegate and author Dr. Vic Fischer, the principles underlying the local government system were:

Self-Government. The article allows some degree of self-determination in local affairs whether in urban or sparsely populated areas.

One basic local government system. The article vests all local government authority in boroughs and cities. It prevents creation of numerous types of local government units, which can become complicated and unworkable

Prevention of overlapping taxing authorities. The article grants local taxing power exclusively to boroughs and cities. This allows consideration of all local needs in the levying of taxes and the allocation of funds. It leads to balanced taxation.

Flexibility. The article provides a local government framework adaptable to different areas of the state as well as changes that occur with the passage of time. It allows classification of units on the basis of ability to provide and finance local services.

State interest. The article recognizes that the state has a very definite interest in and concern with local affairs. The article gives the state power to establish and classify boroughs, to alter boundaries of local units, to prescribe powers of non-charter governments, to withhold authority from home rule boroughs and cities and to exercise advisory and review functions.

The Alaska Constitution itself establishes two forms of local government, cities and organized boroughs. Both are municipal corporations and political subdivisions of the state. A city government exercises its powers within an established boundary, typically encompassing a single community. A city can exist within an organized borough. A borough exercises its powers on a regional basis and may provide services on three levels, areawide (throughout the entire borough), non-areawide (that part of the borough outside of cities), and service areas (size and make-up vary).

Cities and boroughs are further organized as either home rule or general law municipalities. A home rule municipality spells out its powers through an adopted charter that is ratified by voters. It can exercise power not prohibited by state law, federal law or its charter. State law and local ordinances define the powers, duties and functions of a

[7] Alaska's Constitutional Convention, Vic Fischer, University of Alaska Press 1975

general law municipality. Cities and boroughs are also divided into classes with varying powers and responsibilities.

While the constitution provides the basic framework for municipal governments, the responsibility for enacting specifics was delegated to the legislature. Title 29 of the Alaska Statutes establishes the procedures by which municipalities are organized and municipal powers are prescribed.

All local governments have certain fundamental duties such as conducting elections and holding regular public meetings of governing bodies. Beyond that, the powers of municipalities vary, depending upon their classification. Mandatory duties of boroughs, as well as home rule and first class cities in the unorganized borough are education, planning, platting and land use regulation. Organized boroughs also have the duty to collect municipal property, sales and use taxes if the taxes are levied within their boundaries. Beyond these requirements, municipal powers are exercised at the discretion of local governments.

MUNICIPAL TAXATION

AS 29.45-29.46 authorize municipal levy of a property tax and sales and use taxes. With certain limitations, all cities, boroughs and unified municipalities in the State of Alaska may chose to levy a property tax and/or levy and collect a sales tax on sales and services provided within their boundaries.

Municipality	Property Tax	Sales Tax	Other Tax
North Slope Borough	Yes	No	PILT*
Fairbanks North Star Borough	Yes	No	8% Bed Tax
City of Fairbanks	Yes	No	8% Bed Tax 5% Alcohol Tax 8% Tobacco Tax
City of North Pole	Yes	3%	No
City of Delta Junction	No	No	No
Municipality of Anchorage	Yes	No	8% Bed Tax & Car Rental 15% Tobacco Tax Aircraft tax (flat)
Haines Borough	Yes	5.5%	4% Bed Tax
Kenai Peninsula Borough	Yes	2%	No
City of Kenai	Yes	3%	No
City of Seward	Yes	3%	4% Bed Tax
City of Skagway	Yes	4%	8% Bed Tax
City of Valdez	Yes	No	6% Bed Tax

*NSB receives a payment in lieu of taxes for economic development that replaces a local sales and use tax.

Table 12: Current municipal taxation for Municipal Advisory Group communities

REVENUES BY TAX TYPE

The following tables show each municipality's tax types, tax revenues and percentage of total tax revenue by type for 2003. These figures represent tax revenues only—other types of municipal revenue such as fees for services, interest income and grant revenue are not included.

North Slope Borough

Tax	Tax Revenues	Percent of total tax revenue
Property Tax	$199,653,165	98 %
General Sales Tax*	$3,993,063	2 %

*NSB receives a payment in lieu of taxes, in an amount of approximately two percent of total revenues, for economic development that replaces a local sales and use tax.

Fairbanks North Star Borough

Tax	Tax Revenues	Percent of total tax revenue
Property Tax	$68,013,870	98 %
General Sales Tax	0	
Bed Tax 8%	$1,305,822	2 %
Alcohol Tax 5%	Effective July 1, 2004	
Tobacco Tax 8%	Effective July 1, 2004	

City of Delta Junction

No property, sales or special taxes

City of Fairbanks

Tax	Tax Revenues	Percent of total tax revenue
Property Tax	$8,076,192	68.3 %
General Sales Tax	0	
Bed Tax	$1,786,026	15.1 %
Alcohol Tax	$1,162,927	9.8 %
Tobacco Tax	$799,567	6.7 %

City of North Pole

Tax	Tax Revenues	Percent of total tax revenue
Property Tax	$ 755,335	36.1 %
General Sales Tax 3%	$1,336,630	63.9 %

City of Valdez

Tax	Tax Revenues	Percent of total tax revenue
Property Tax	$20,260,164	98.8 %
General Sales Tax	0	
Bed Tax 6%	$ 256,803	1.2 %
Other Special Use Tax	0	

Municipality of Anchorage

Tax	Tax Revenues	Percent of total tax revenue
Property Tax	$315,874,931	93.6 %
General Sales Tax	0	
Bed Tax	$ 11,007,248	3.2 %
Alcohol Tax	0	
Tobacco Tax	$ 5,349,091	1.5 %
Other Special Use Tax	$ 4,682,406 (Car rental tax) $ 202,860 (Aircraft tax)	1.3 %

Kenai Peninsula Borough

Tax	Tax Revenues	Percent of total tax revenue
Property Tax	$41,693,443	74.3 %
General Sales Tax 2%	$14,370,582	25.6 %

City of Kenai

Tax	Tax Revenues	Percent of total tax revenue
Property Tax	$1,389,599	26.0 %
General Sales Tax 3 %	3,953,561	73.9 %

City of Seward

Tax	Tax Revenues	Percent of total tax revenue
Property Tax	$ 712,175	23.0 %
General Sales Tax 3%*	$2,165,586	69.9 %
Bed Tax 4%	$ 217,482	7.0 %

*Effective April 1, 2003 the sales rate is 4%

Haines Borough

Tax	Tax Revenues	Percent of total tax revenue
Property Tax	$1,818,643	45.3 %
General Sales Tax 5.5%	$1,899,249	47.3 %
Bed Tax 4%	$ 101,683	2.5 %

City of Skagway

Tax	Tax Revenues	Percent of total tax revenue
Property Tax	$1,148,146	30.4 %
General Sales Tax 4%	$2,531,977	67.1 %
Bed Tax 8%	$ 91,782	2.4 %

Source: Alaska Taxable 2003, Alaska Dept. of Community and Economic Development

AS 29.45 LOCAL PROPERTY TAXES

A borough may levy an areawide property tax for areawide functions; a non-areawide property tax for functions limited to the area outside the cities; and a property tax in a service area for functions limited to the service area. Other types of municipalities may levy a property tax subject to specific provisions in AS 29.45.550-AS 29.45.590.

All real and personal property is taxable unless it is exempted from property taxation. Title 29 defines “real property” as land and improvements, all possessory rights and privileges appurtenant to the property, and includes personal property affixed to the land

or improvements. Personal property is defined as tangible property other than real property, such as merchandise, stock in trade, machinery, equipment, furniture, fixtures, vehicles, boats and aircraft. Required exemptions from municipal property taxation are specified in AS 29.45.030. Notable required exemptions include an exemption for property held by a public corporation, state property, property of the United States or land that is in the trust established by the Alaska Mental Health Trust, household furniture and personal effects of members of a household, property use exclusively for non profit, religious, charitable, cemetery, hospital, or educational purposes, and natural resources in place including coal, ore bodies, mineral deposits and other deposits of value laid down by natural processes. Also exempt from taxation is the first $150,000 of value of owner-occupied primary residences of those residing in Alaska who are 65 years of age or older or disabled veterans. Property owned by ANCSA (Alaska Native Claims Settlement Act) Native corporations is also exempt from municipal property tax unless the property is leased or developed.

AS 29.45.050 provides for optional exemptions and exclusions from local property taxation which the taxing authority may choose to exempt or exclude. These are typically executed by ordinance, although some optional exemptions and exclusion require approval of the voters. Title 29 lists sixteen types of optional exemptions, the most commonly exercised being the exemption of up to $20,000 (previously $10,000) of value for primary residences, exemptions for historic structures or properties, and the exemption of personal property.

Municipality	Levies	Tax Cap	Smallest / largest mill levies	Number of service areas
North Slope Borough	Gen. Government: 7.32 (Mill Levy areawide) Education[1]: Debt Service: 11.24 Total: 18.56	No local tax cap – use 225% state cap formula.		
Fairbanks North Star Borough	Borough levy: 15.403	Revenue cap set at previous year's revenue plus CPI, new construction, bonding, voter approved services, taxes for new judgments and special appropriations on an emergency basis.	Smallest 16.190 Largest: 31.096	127
City of Fairbanks	School & Library Bonds: 0.992 General Government (borough): 4.934 Education: 7.767 General Government (city): 6.516 Total 20.209			

Municipality	Levies	Tax Cap	Smallest / largest mill levies	Number of service areas
City of North Pole	Total 17.880 (includes FNSB levy)			
Municipality of Anchorage	General Government: 1.50 Education: 7.37 Fire: 1.64 Roads/Drainage: 3.10 Police: 2.25 Parks & Recreation: 0.74 Building Safety: 0.01 Total: 16.61	Revenue cap set at previous year's revenue plus CPI, new construction, bonding, voter approved services, taxes for new judgments and special appropriations on an emergency basis.	Smallest: 8.87 Largest: 16.61	44
Haines Borough	General Government: 4.04 Education: 6.23 Fire District: 1.81 Total: 12.08	No tax cap.	Smallest: 6.23 Largest: 12.08	4
Kenai Peninsula Borough	Borough levy: 6.50	Borough tax cap set at 8 mills.	Smallest: 8.10 Largest: 12.20	15
City of Kenai	General Government: 5.00 Borough: 6.50 Hospital: 0.50 Kenai Peninsula College: 0.10 Total: 12.10	Tax rate is limited to 3% of assessed property value, excepting that the municipality may levy taxes in an amount sufficient to pay the principal and interest on bonds that come due.		
City of Seward	Total: 9.72 (includes KPB levy)			
City of Skagway	General Government: 7.78 Education[1]:	No tax cap	Smallest: 1.40 Largest: 8.27	5
City of Valdez	General Government: 14.0395 Education[1]: 5.9605 Total: 20.000	Tax cap set at 20 mills – cap does not apply to bonds.		

Source: Alaska Taxable 2003, Alaska Department of Community and Economic Development

[1] The North Slope Borough, Valdez and Skagway use the alternative education funding formula to determine the local match.

Table 14: 2003 Property tax levies for Municipal Advisory Group communities

AS 43.56 OIL AND GAS PRODUCTION PROPERTY TAX

The State of Alaska levies a 20-mill tax against oil and gas production property, crediting taxpayers for municipal property taxes levied on the property. The state further sets a limit on municipalities of a 20-mill levy on such property for borough operations. The mill rate levied on oil and gas property may vary within a given municipality, just as the mill rate for other property will vary depending on where the property is located within the municipality. As is the case for other property in a municipality the rates levied include the areawide, non-areawide and/or service area mill rates. Under this joint state and local taxation, the difference between the municipal mill rate and 20 mills goes to the state.

The 20-mill maximum allows for changing circumstances in a municipality, such as an increased mill rate due to voter approved bonds. If a municipal mill rate rises in a given year, the state portion of taxes collected declines. Conversely, if a municipal rate is lowered, the state portion increases. The 20-mill levy on oil and gas property in the unorganized borough is collected and expended in its entirety by the state.

Oil and gas property values are determined by the state, while property taxed under Title 29 is assessed by the local jurisdiction. In the past, value could be determined on either a cost or income approach. Insofar as assessment reflects some judgment the property tax administration on oil and gas facilities has not been without dispute.

The oil and gas production property tax has remained essentially unchanged since 1973 when it was first adopted. Alaska's oil and gas property tax has provided some level of stability for over thirty years, with the exception of disputes over valuation methodology. The Stranded Gas Development Act and its reauthorization changed that structure by allowing for a negotiated contractual tax structure.

In addition to statutorily mandated exemptions and statutorily allowed exemptions, AS 43.56 provides for certain exemptions of oil and gas production and pipeline property, including oil and gas reserves in place. Real and personal property that is used or committed by contract or other agreement for use within this state primarily in the exploration for, production of, or pipeline transportation of gas or unrefined oil, or for the operations maintenance of such facilities is taxed under AS 43.56 rather than under AS 29.45. Facilities that are used for both oil and gas and other purposes are taxed under AS 43.56 if that property is actually used for one or more of the stated purposes more than 50 percent of the property's total operational time during the preceding year (15 AAC 56.075). The definition for dual use facilities is thought to be confusing; the Municipal Advisory Group requested that conditions under which dual use facilities are to be taxed be clarified in order to protect existing municipal tax bases.

As of January 1, 2003, seven municipalities within the state had taxable oil and gas property. They are, in order of highest value—North Slope Borough, City of Valdez, Kenai Peninsula Borough, Fairbanks North Star Borough, Municipality of Anchorage Cordova and the City of Kenai. Total oil and gas property tax revenues in 2003 were $220,865,409.

FULL AND TRUE VALUE

Title 29 requires the state assessor to assess all taxable real and personal property at its full and true value as of January 1 of the assessment year. The full and true value is the estimated price that the property would bring in an open market and in prevailing market conditions in a sale between a willing seller and a willing buyer conversant with the property and with general price levels. All property is to be included, except property that is exempt from taxation by a statutory mandate. Property that is exempted by local option is included in the full value determination. The state assessor then compiles the full value determination for each municipality annually and notifies each of the full value determination. The full and true value of all taxable property, whether the property is actually taxed or not, is included. The annual notification from the state assessor contains full value for real property, personal property and oil and gas property.

The Full and True Value Determination plays a significant role in state funding for education. In addition, prior to program elimination, full and true value determination also played a significant role in determining local allocations for the Safe Communities program and State Municipal Revenue Sharing.

Title 14 of Alaska Statutes establishes the Public School Foundation Program that, in conjunction with federal and local governments, provides funding for K-12 education. Under this program, commonly referred to as the foundation funding formula, a calculation is performed for the funding needs for each school district in the state. Included in the calculation are such factors as student enrollment, consideration of school size, a state approved cost factor, a funding adjustment for special needs of students, and number of correspondence students. These factors are then totaled and multiplied to arrive at a funding level by district that is defined as "basic need" by the State of Alaska. Basic need is reduced by the minimum amount that local taxpayers (municipalities) are expected to pay. It is also reduced by a certain percentage of the federal funding provided for education. The resulting dollar amount is known as state aid to education. Overall education funding consists of state aid, a required local contribution, and federal impact aid.

The formula defines the required local contribution as the equivalent of a four mill tax levy on the full and true value of the taxable real and personal property in the district as of January 1 of the second preceding fiscal year, not to exceed 45 percent of a district's basic need (as defined by the State). The North Slope Borough, City of Valdez and the City of Skagway are three municipalities whose mandatory contribution to education is based on the 45 percent of basic need method.

All other municipalities' required contribution is based on four mills on the full and true value of taxable property from a base year of 1999 and half the increase in value over subsequent years (effectively two mills on post-1999 property). As local assessed values increase, the required local contribution increases, and state aid decreases. Thus, if oil and gas property is exempt from property taxes, the issue of whether or not those properties values are included in the full and true value determination arises. If the value of a gasline is included in the full and true value determination, local required contribution would be based on two mills of that valuation without the attendant ability to tax the property.

It should be noted that in addition to required local contribution to education, AS14.17.400 outlines the conditions in which a city or borough may make an additional local contribution of not more than the greater of the equivalent of a two mill levy on the full and true value of the taxable real and personal property in the municipality or twenty-three percent of the district's basic need as defined by the state. Historically, municipalities across the state have funded their respective school districts at levels significantly higher than the required contribution.

In all discussions of the Municipal Advisory Group, municipalities understood that the current practice of the state, and the state assessor, was to exclude from Full and True Value calculations any exempt property, and to exclude from all tax cap formulas receipt of Payments in Lieu of Taxes. This understanding was fundamental to municipal acceptance of PILT proposals and adoption of PILT resolutions.

AS 29.45 LOCAL SALES AND USE TAXES

AS 29.45.650-710 authorize the levy of sales and use taxes at the municipal level. The statutes give broad authority to municipalities to levy taxes on sales, rents and services provided within the municipality.

There are few limitations placed upon municipalities levying a sales tax:

- Orbital space facilities are exempt from the levy of sales tax
- Alcohol may not be taxed unless other items are similarly taxed.
- A borough may not levy a sales tax on food coupons, food stamps, or other types of certificates issued under the federal Food Stamp Act.
- A borough may not levy or collect a sales or use tax on (1) physical transfer of refined fuel, unless in connection with a sale or use in the borough, or (2) wholesale sales or transfers of fuel refined in the borough. A sale is in the borough if the fuel is delivered to the buyer in the borough.
- Local ordinance may grant other exemptions.

A general law municipality that levies a sales tax may also levy a use tax on the storage, use or consumption of tangible personal property; however, the use tax rate must be equal to the rate of sales tax and may only be levied on buyers. These limitations do not apply to home rule municipalities. There are no limits by statute on the rate of levy for sales or use taxes for a municipality.

Such taxes are defined in Title 43 as taxes imposed with respect to transfer for a consideration of ownership, possession or custody of tangible personal property or rendering of services measured by the price of the tangible personal property transferred or services rendered and which is required by state or local law to be separately stated from the sales price by the seller or which is customarily separately stated from the sales price, but does not include a tax imposed exclusively on the sale of a specific commodity or article or class of commodities or articles.

There are three notable components of a sales tax – the rate of taxation, the exemptions from the tax and transaction limits. Title 29 allows municipalities' great flexibility in

structuring sales tax. There are no limitations on locally preferred optional exemptions from sales tax. The options vary greatly from municipality to municipality and are numerous. Many municipalities exempt casual sales, human health care services, subscriptions to newspapers and periodicals, funeral services or supplies, financial service transactions, sales and service to nonprofits, child care, heating oil, sales of insurance and surety bonds, purchases made with food stamps, and sales of transportation services. In addition, some municipalities exempt building materials and services from sales tax.

A general law municipality that levies a sales tax may also levy a use tax on the storage, use or consumption of tangible personal property. The use tax rate must be equal to the rate of sales tax and may only be levied on buyers. There are no limits by statute on the rate of levy for sales or use taxes for a municipality.

Under provisions of the Alaska Stranded Gas Development Act, AS 29.45.810, exemption from municipal taxation, for a party to a contract approved by the legislature as a result of submission under the SGDA, the property, gas, products and activities associated with such approved, qualified project are exempt, as specified in the contract, from all taxes identified in the Act that would be levied and collected by a municipality under state law as a consequence of the participation by the party in the approved project.

Sales tax limits and exemptions. Evaluating the cost/benefit of sales taxes requires discussing the various transaction limits and exemptions municipalities have in their sales tax code. A complete list of exemptions for all municipalities that levy a sales tax is attached.

Haines Borough: 31 exemptions from sales tax; no transaction limits, with the exception of the sale of construction materials and services exceeding $10,000. Construction materials are defined as those items becoming a permanent part of the structure. Contractors may apply for a numbered sales tax exemption permit that exempts the purchaser from paying sales tax on the particular project.

The Haines Borough defines “retail sale” as any sale of real or tangible personal property, including barter, credit, installment and conditional sales, for any purpose other than resale in the regular course of business. The delivery of property in the Borough by a seller whose principal place of business is outside the Borough to a buyer or consumer is a retail sale made within the Borough if such retailer maintains any office, distribution, or sales house, warehouse or any other place of business, or solicits business or receives orders through any agent, salesperson, or other type of representation within the Borough.

City of Kenai: Taxable limit is $500 per individual purchase.

Kenai Peninsula Borough: Approximately 22 exemptions from sales tax. Taxes are assessed on the first $500 per transaction. The borough has an exemption for sales of building construction materials for owners and builders, which applies only if the materials become part of the permanent structure. The borough charges a fee of $100 for a tax exemption certificate for owner/builders.

City of North Pole: 17 exemptions from sales tax. The transaction cap amount is $200. With a 3 percent sales tax, the maximum tax per transaction is $6.

North Slope Borough: The borough had a three percent sales and use tax on the first $1,000 of each retail sale. The originating ordinance showed eight exemptions from tax, including groceries, fuel for home consumption and the sale of basic necessities of life in the Arctic. The sales and use tax was repealed in 1991 when a payment in lieu of taxes for economic development was negotiated with the oil industry.

City of Seward: 15 exemptions from sales tax. The sales tax is applied only to the first $500 of each separate sale, rent or service transaction. A transaction involving payment for services or personal property to be rendered or delivered over a period of more than one month for a consideration in excess of $500 shall be treated as several separate transactions.

City of Skagway: 22 exemptions from sales tax in code, no specific transaction limit. However, sales of building and construction materials exceeding $2,500 for use on any one construction project approved by a city building permit and paid for by any one purchaser during any 12 consecutive month period is exempt from sales tax. In addition, contracts and subcontracts for any new construction and reconstruction services on projects and structures for industrial, commercial, residential, and nonprofit purposes are exempt.

Sales tax impacts. Sales and use taxes are defined in AS Title 43 as a tax imposed with respect to the transfer for a consideration of ownership, possession or custody of tangible personal property or the rendering of services measured by the price of the tangible personal property transferred or services rendered and which is required by state or local law to be separately stated from the sales price by the seller, or which is customarily separately stated from the sales price, but does not include a tax imposed exclusively on the sale of a specifically identified commodity or article or class of commodities or articles. The definitions and descriptions of point and place of sale, necessary to determine in which circumstances a sales tax applies, can be complex, as the study team found when reviewing various municipal codes for this report.

In order to determine the cost/benefit of eliminating or modifying municipal sales/use taxes for purposes of a contract under the SGDA, the following items were discussed in detail at various Municipal Advisory Group meetings:

- Materials/goods particular to a gas pipeline project
- Point of sale for materials/goods
- Likely tax amount for applicant given sales tax rates, exemptions and transaction limits
- Cost of administration of modifying or exempting gas pipeline materials, goods or services from existing taxes
- Ease of expanding existing exemptions, i.e. construction materials, for gas pipeline materials, goods, and services

The consensus of the Municipal Advisory Group was that the cost and difficulties associated with administering an Alaska Natural Gas Pipeline exemption from municipal sales taxes far outweighed any potential benefits to the economics of the project. Sales tax rates, exemptions, transaction limits and definition of point of sale vary by economically affected communities. Clearly identifying which goods and/or services

would be exempted from sales tax was deemed to be problematic at best. Defining goods and/or services that would be directly attributable to construction of the pipeline project, and thus exempt, would be difficult to differentiate from those goods that would be considered indirectly related to the project. Concern was expressed about the difficulty of keeping separate transactions for gas pipeline and non-gas-pipeline related sales, the burden being on the purchaser. After reviewing various municipalities' transaction records, it was noted that the amount of actual taxes to be exempt would not likely have any overall economic impact on the project.

A less tangible aspect of exempting the gas pipeline project from municipal sales taxes was discussed – that of the fairness of exempting the project from taxation when all other purchases within the taxing jurisdiction are required to pay. To further the fairness discussion, the Municipal Advisory Group adopted Resolution #3, which in part stated that there should be no tax exemptions under the SGDA for municipal sales and use taxes and that the SGDA contract may include provisions to ensure sales taxes are not targeted to gas pipeline construction and operations.

AS 29.46 MUNICIPAL SPECIAL ASSESSMENTS

Title 29 provides municipalities with the option of creating special assessment districts, sometimes referred to as local improvement districts. A municipality may assess against property to be benefited by an improvement all or a portion of the cost of acquiring, installing or constructing capital improvements. Special assessments apply to property of the state and federal government as well as private property. If an entity refuses to pay the assessment, it can be denied the benefit of the capital improvements.

The governing body can initiate improvement proposals by ordinance, or by a petition to the governing body by the owners of one-half the value of the property to be benefited. Procedures relating to the creation of a special assessment district, making the local improvements, levying and collecting assessments and financing the improvements can be prescribed by ordinance. Allowable costs are acquiring, installing making or constructing the local improvement, the costs of engineering and surveying, costs related to public notice, interest on interim financing, the cost of legal services and the cost financing, including the issuance of bonds. Appeal and payment procedures are spelled out in statute. Should the municipality issue and sell special assessment bonds to pay for all or part of the improvement in a special assessment district, principal and interest must be paid solely from the levy of the assessments against the property to be benefited.

OTHER MUNICIPAL TAXES AND LEVIES

Title 29 specifically allows real or personal property tax and sales and use taxes. The Alaska Constitution confers upon municipalities a broader authority to "levy a tax or special assessment, and impose a lien for its enforcement." Municipalities may levy a tax other than property, sales or use even if the tax is not specifically authorized by statute.

There are two municipalities in Alaska that levy severance taxes, which are a type of excise tax. Excise taxes are simply defined as a tax on a particular good or service. Severance taxes are a tax on the severance, or taking, of natural resources such as fish, timber, minerals and materials for commercial purposes. Severance taxes can be assessed on different variables of the severance of natural resources such as weight, volume, or number and species or type.

Two Alaska boroughs currently have a severance tax. Kodiak Island Borough assesses a 0.00925 percent tax on the value of fish production, the value of board feet of timber and value of gravel extraction. The Denali Borough assesses five cents per ton tax on coal and limestone and five cents per yard tax on gravel.

A 1986 Attorney General opinion concluded that first class boroughs have the legal authority to levy severance taxes within their boundaries. There has not been an Attorney General opinion specifically on the subject of municipal excise taxation. Although given the liberal construction of local government's powers in the state constitution, it is logical to assume that other types of excise other than severance tax could be levied.

As residential property taxpayers across the state object to rising property taxes and state aid to municipalities has declined, municipalities have looked at so called alternative revenues as a means of spreading the tax burden. Types of taxes that have been examined include severance taxes, business license taxes and employment taxes – similar to the former school tax that was a flat per year tax on persons employed. All of these taxes are thought to be permissible under current statutes.

V. Economic Impact Analysis

UNDERSTANDING IMPACT ANALYSIS

Economic impact analysis expresses the effect of a sector or new project on other sectors of the local economy and is predominately measured in terms of output (final demand), income, and employment. Tracing these activities throughout an economy and subsequently measuring the aggregate effects of these activities upon a defined impact region illustrates how businesses, governments, and consumers conduct economic transactions that are innately interconnected.

For example, businesses sell resources to both households and other businesses in the form of goods and services; households sell resources to both businesses and governments in the form of labor; and governments collect taxes from both businesses and households to pay for social and public services. Because of these interconnections, a change in one sector often impacts other sectors. When local business activity expands in direct response to an economic stimulus or economic event, increases in employment, labor income and output can substantially impact the local housing market, the demand for government services and the level of retail spending in that region. Furthermore, local government expenditures and revenues will be impacted through changes in the local tax base and local tax receipts.

Within the context of sound economic theory, the export of goods, services and labor is the engine of economic growth for a region. In many cases, this engine of economic growth is predicated by project construction or some other economic stimulus. The increased demand for goods, services and labor to support the source of the stimulus, in turn generates expansion in many of the support activities of the local economy.

When industry produces goods and services that are sold to consumers outside the region, this export of goods and services brings new money into the local economy; resulting in an additional increase in local income. Furthermore, industry produces goods and services that are primarily consumed locally. This production and ultimate consumption of goods and services does not produce a net addition to the local economy, because the existing dollars are inherently re-circulated within it. Although some money leaks out of the local economy while it re-circulates, larger and more diverse local economies will experience less leakage, because more purchases will be made locally. Consequently, money will tend to leak out at a slower rate. Conversely, smaller and less-diverse economies will experience an accelerated rate of leakage, because the local productive capacity to meet demand quickly becomes saturated and strained.

By building an economic model that represents the flows of economic activity between sectors within a region, this model captures what each business and/or sector must purchase from every other sector in order to produce a dollar's worth of goods or services. When demand for a good increases, the sector producing it purchases inputs from other sectors, which in turn purchase inputs from other industries. All of these sectors will purchase additional labor inputs to produce the goods, and employees will use their income to purchase goods and services from within the economy as well. This

chain of effects, known as the multiplier effect, captures the distributive impacts of construction spending across a broad range of industries. The multiplier measures the ripple effect that each sector and/or project has on the wider economy and is derived from the total direct, indirect and induced impacts measuring output, income and employment. Essentially, multipliers capture the size of the secondary effects on a region, usually as a ratio of total effects to direct effects.

Direct impacts are the initial, immediate effects caused by a specific activity… employment, income, and output. These direct impacts initiate subsequent rounds of income creation, spending and re-spending and ultimately result in indirect and induced effects. These economic impacts occur as a direct consequence of constructing the pipeline itself and are comprised of the financial expenditures incurred by entities that are physically constructing this gas pipeline.

Indirect impacts are secondary impacts, which are the changes to production, employment, and income that occur as a result of the direct effects. They are derived from the forward and backward linkages that produce the direct effect. By changing the input needs of directly affected industries, indirect impacts are being created. For example, the construction sector of a local economy indirectly supports jobs in the manufacturing sector in the form of lumber, tools and equipment.

Induced impacts also are secondary impacts—the effects of households spending their wages derived from direct and indirect activities. For example, household purchases of goods and services result from increased labor income from the employee at the lumberyard that supplies the construction industry with lumber.

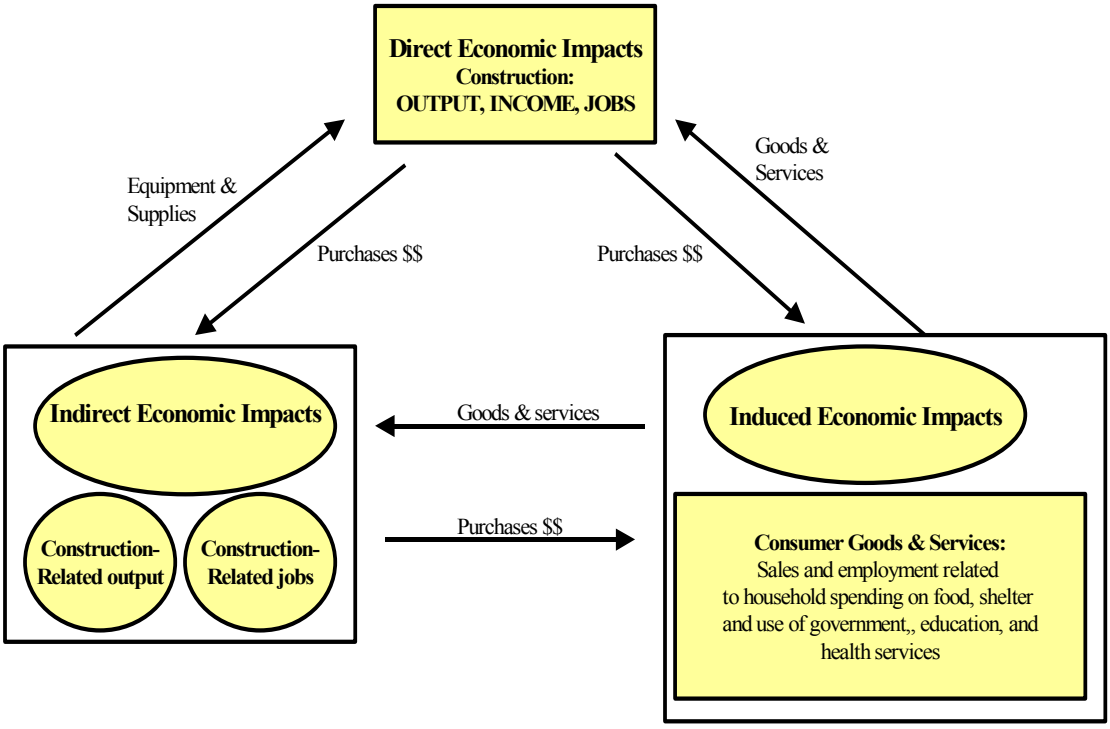


Figure 16: Direct, indirect and induced impact model

GENERAL LABOR FORCE IMPACTS ON INDUSTRY

Within the context of economic analysis, labor force impacts are primarily measured by assessing the changes in direct, indirect and induced employment figures from original baseline reports. Furthermore, the sum of the direct, indirect and induced jobs is equal to the total economic impact of employment in regard to this project.

The tables on the following pages provide further detail on the types and expected size of labor force impacts of the gas pipeline project. In accordance with the non-disclosure of confidential data, the following tables give an aggregate impact of the model. Of primary significance in these tables are the impacted industries…the percentages and numbers will slightly change when the model is disaggregated. The order and relative size of industry impact should give the relevant Municipal Advisory Group communities an indication of how the different industries will be impacted by direct, indirect, Type I, induced and total job impacts. (Note that columns may not appear to total as shown due to rounding differences.)

The data within the tables ranks the top fifteen impacted industries relative to the highlighted variable and accompanying narrative describing that variable. Also, the yellow highlighted columns are ranked in descending order according to estimated employment impact.

Rank	Description	Baseline
1	State & Local Education	25,285
2	Food services & drinking places	19,106
3	State & Local Non-Education	11,809
4	Real estate	8,965
5	Physician & health practitioner offices	8,242
6	General merchandise stores	7,528
7	Federal Non-Military	7,150
8	Other new construction	6,681
9	Engineering & architectural services	6,667
10	Hospitals	6,105
11	Oil & gas operations - support activities	5,935
12	Wholesale trade	5,845
13	Other Federal Government enterprises	5,059
14	Food & beverage stores	4,915
15	Air transportation	4,865

Table 15: Baseline economy, industry at start of project[8]

[8] Only the top 15 industries are listed.

Baseline employment. Baseline employment refers to the total employment of each industry prior to economic impact of the project. Baseline numbers are referenced in terms of calculating the percentage change in direct, indirect and induced employment impacts. The industry rankings on this baseline employment chart show the largest industries within the Municipal Advisory Group communities prior to construction. Moreover, these rankings provide a basic overview and structure to the existing economy relative to what industries could possibly dictate growth within the economy.

The largest employer category in Alaska is state and local government – totaling 37,094 employees. State and local government can be further segregated into both education and non-education employment. Shown separately, state and local government education employment and state and local government non-education employment rank, respectively, first and third in the baseline employment rankings, with food service and drinking establishments ranking second.

			Per Year					Percent Change	
Rank	Description	Baseline	Direct	Indirect	Type I	Induced	Total	Type I	Total
1	Pipeline construction	534	3,695	-	3,695	2	3,697	691.9%	692.3%
2	Other new construction	6,681	475	-	475	8	483	7.1%	7.2%
3	Truck/rail transportation	2,634	255	81	335	19	354	12.7%	13.4%

Table 16: Direct employment impacts

Direct employment. Direct employment impacts refer to the physical construction of the pipeline itself and are comprised of the pre-construction, construction, and operational maintenance hires relative to constructing the pipeline. Pipeline construction, new construction and truck/rail transportation detail the direct hires that will be needed for the project. These three industries are an accurate representation of all the specific direct hires that occur within each of the respective industry activities.

Rank	Description	Baseline	Per Year					Percent Change	
			Direct	Indirect	Type I	Induced	Total	Type I	Total
1	Engineering & architectural services	6,667	-	405	405	16	420	6.0%	6.3%
2	Truck/rail transportation	2,634	255	81	335	19	354	12.7%	13.4%
3	Wholesale trade	5,845	-	69	69	58	127	1.1%	2.1%
4	Employment services	2,497	-	42	42	21	63	1.6%	2.5%
5	Automotive repair & maintenance, except car	2,766	-	37	37	22	59	1.3%	2.1%
6	Machinery/equipment rental & leasing	535	-	35	35	2	37	6.5%	6.8%
7	Food & beverage stores	4,915	-	32	32	70	102	0.6%	2.0%
8	Real estate	8,965	-	32	32	88	120	0.3%	1.3%
9	Scenic & sightseeing transportation and sup	2,695	-	27	27	7	33	0.9%	1.2%
10	Services to buildings & dwellings	3,671	-	25	25	29	54	0.6%	1.4%
11	Accounting services	2,030	-	23	23	17	40	1.1%	1.9%
12	Automotive equipment rental & leasing	1,241	-	20	20	18	38	1.6%	3.0%
13	Other Federal Government enterprises	5,059	-	19	19	47	66	0.3%	1.3%
14	Commercial machinery repair & maintenance	725	-	18	18	2	20	2.4%	2.7%
15	General merchandise stores	7,528	-	18	18	65	83	0.2%	1.1%

Table 17: Indirect employment impacts

Indirect employment impacts represent a secondary impact, and are indicative of the employment created as a result of the activities supporting the direct impacts. As with the indirect impact table, engineering and architectural services represent the lion's share of the indirect impacts. It is reasonable and fair to assume that most of these impacts will be derived regionally out of Anchorage. When this model was disaggregated with respect to the impacts on each community, this assumption modeled accordingly.

Rank	Description	Base-line	Per Year					Percent Change	
			Direct	Indirect	Type I	Induced	Total	Type I	Total
1	Pipeline construction	534	3,695	-	3,695	2	3,697	691.9%	692.3%
2	Other new construction	6,681	475	-	475	8	483	7.1%	7.2%
3	Engineering & architectural services	6,667	-	405	405	16	420	6.0%	6.3%
4	Truck/rail transportation	2,634	255	81	335	19	354	12.7%	13.4%
5	Wholesale trade	5,845	-	69	69	58	127	1.1%	2.1%
6	Employment services	2,497	-	42	42	21	63	1.6%	2.5%
7	Auto repair & maintenance, except car	2,766	-	37	37	22	59	1.3%	2.1%
8	Machinery/equipment rental & leasing	535	-	35	35	2	37	6.5%	6.8%
9	Food & beverage stores	4,915	-	32	32	70	102	0.6%	2.0%
10	Real estate	8,965	-	32	32	88	120	0.3%	1.3%
11	Scenic & sightseeing transportation and sup	2,695	-	27	27	7	33	0.9%	1.2%
12	Services to buildings & dwellings	3,671	-	25	25	29	54	0.6%	1.4%
13	Accounting services	2,030	-	23	23	17	40	1.1%	1.9%
14	Automotive equipment rental & leasing	1,241	-	20	20	18	38	1.6%	3.0%
15	Other Federal Government enterprises	5,059	-	19	19	47	66	0.3%	1.3%

Table 18: Type I employment impacts

Type I employment impacts are the sum of both the direct and indirect effects. Type I impacts ultimately give insight to the employment changes of industries in which final demand changes have occurred. Furthermore, Type I impacts add the changes in employment that result from inter-industry purchases as they respond to the new demands of the directly impacted industries. As can be seen from the Type I impact chart, pipeline construction, other new construction, engineering and architectural services and truck/rail transportation represent– about 87 percent of Type I jobs created within Alaska.

Rank	Description	Baseline	Per Year					Percent Change	
			Direct	Indirect	Type I	Induced	Total	Type I	Total
1	Food services and drinking places	19,106	-	12	12	232	244	0.0%	1.28%
2	State & Local Education	25,285	-	-	-	172	172	0.0%	0.6%
3	Physician & health practitioner offices	8,242	-	0	0	162	162	0.0%	1.9%
4	Hospitals	6,105	-	-	-	118	118	0.0%	1.9%
5	Real estate	8,965	-	32	32	88	120	0.3%	1.3%
6	Federal Non-Military	7,150	-	-	-	83	83	0.0%	1.1%
7	State & Local Non-Education	11,809	-	-	-	80	80	0.0%	0.6%
8	Private households	3,692	-	-	-	77	77	0.0%	2.1%
9	Food & beverage stores	4,915	-	32	32	70	102	0.6%	2.0%
10	General merchandise stores	7,528	-	18	18	65	83	0.2%	1.1%
11	Social assistance, except child day care services	4,690	-	0	0	62	62	0.0%	1.3%
12	Motor vehicle & parts dealers	4,333	-	13	13	61	74	0.3%	1.7%
13	Wholesale trade	5,845	-	69	69	58	127	1.1%	2.1%
14	Other Federal Government enterprises	5,059	-	19	19	47	66	0.3%	1.3%
15	Nonstore retailers	3,481	-	9	9	43	52	0.2%	1.5%

Table 19: Induced employment impacts

Induced impacts refer to the changes in employment that result from the changes in spending from households as income increases or decreases due to changes in final demand. Induced impacts are a significant portion of the aggregate employment impact representing about 46 percent of the total impact. Because these induced impacts are a function of how household spending patterns change with regard to impact, the breadth of the change across different industries is much wider. Food services and drinking establishments, state and local education, physician and health practitioner offices and hospitals are the top four respectively ranked industries.

Rank	Description	Baseline	Per Year					Percent Change	
			Direct	Indirect	Type I	Induced	Total	Type I	Total
1	Pipeline construction	534	3,695	-	3,695	2	3,697	691%	692%
2	Other new construction	6,681	475	-	475	8	483	7.1%	7.2%
3	Engineering & architectural services	6,667	-	405	405	16	421	6.0%	6.3%
4	Truck/rail transportation	2,634	255	81	335	19	354	12.7%	13.4%
5	Food services & drinking places	19,106	-	12	12	232	244	0.0%	1.2%
6	State & Local Education	25,285	-	-	-	172	172	0.0%	0.6%
7	Physician & health practitioner offices	8,242	-	0	0	162	162	0.0%	1.9%
8	Wholesale trade	5,845	-	69	69	58	127	1.1%	2.1%
9	Real estate	8,965	-	32	32	88	120	0.3%	1.3%
10	Hospitals	6,105	-	-	-	118	118	0.0%	1.9%
11	Food & beverage stores	4,915	-	32	32	70	102	0.6%	2.0%
12	General merchandise stores	7,528	-	18	18	65	83	0.2%	1.1%
13	Federal Non-Military	7,150	-	-	-	83	83	0.0%	1.1%
14	State & Local Non-Education	11,809	-	-	-	80	80	0.0%	0.6%
15	Private households	3,692	-	-	-	77	77	0.0%	2.1%

Table 20: Total employment impacts

Total employment. Total employment impacts represent the sum of the direct, indirect and induced employment impacts. Interpreted another way, total employment impacts represent the total number of jobs created due to construction of the pipeline. This includes the following:

- **Direct hires**, which are physically and immediately involved in the construction of pipeline itself
- **Indirect hires**, which provide the support activities to the direct operations of the pipeline – much like the accounting firms and architectural firms
- **Induced hires**, which are employment impacts that result from households spending their wages derived from direct and indirect activities.

SCOPE OF MODEL

The IMPLAN model scope defines the relevant activities taking place during pipeline construction. Segments of this model, discussed in further detail below, are as follows: construction (pre-construction and construction activities), pipe coating, transport and logistics, gas treatment plant (GTP), and operations and maintenance. Construction costs in this model are all pre-construction and construction activities associated with building the physical pipeline, constructing the camps, and building the compressor stations

Pre-construction activities. Pre-construction impacts are a direct result of the preparation work needed in order for the physical construction of the pipeline to begin. Gravel and sand will be needed to build many of the field production and pipeline facilities pads; camps and storage facilities; snow and ice road pads; and all-weather roads. Before construction starts, mobilization of materials and construction equipment will be required to prepare areas along the pipeline route with supplies such as line pipe, coating materials, valves, and processing equipment. Enhancement and maintenance of the transportation infrastructure to move these materials is critically important.

Construction activities. Pipeline construction generally entails the following tasks:

- Surveying and clearing right-of-way (ROW) – this is the strip of land that hosts the pipeline, and where on-site construction activities occur. Surveying, clearing the land of brushes and trees, and grading that ultimately allow the workers and their respective equipment the ability to pursue construction, inspection and maintenance of the pipeline.
- ROW preparations – includes grading the ice/snow and/or gravel pads that will be built to allow for the movement of heavy equipment and additional supplies and materials.
- Bending the pipe – specific machines used to bend pipe with respect to the contour of land without compromising strength at the respective bends.
- Welding – joining lengths of pipe at a weld-joint that is physically stronger than the pipe itself.
- Digging the trench – using backhoes to excavate land where the pipe will lay
- Lowering the pipe – tractors with special side-booms that require special training will perform this task.
- Installation of valves and special fittings.
- River and road crossings – pipeline crossings at rivers, streams, roads and other obstacles that require special attention to maintain environmental integrity.
- Backfilling the trench – entails returning the excavated soil to the trench where the pipeline resides.
- Testing – checking integrity & safety of line.

Pipe Coating. The manufacturing process of coating the pipe with a non-corrosive material essential to the construction of the pipeline is a logistical consideration within this model because the pipe needs to get transported from the port of entry to the pipe coating facility.

Transport and logistics. Transport and logistics refers to all transportation activities involved in moving the pipe from their respective ports of entry to their ROW location. Transportation via railroad, truck, barge and freighter are included within this category. Furthermore, mobilization and demobilization of pipe, materials, equipment, and people are all costs incurred in the construction of all pipeline components. To the extent that dredging is required for barge transport into Prudhoe Bay, costs would be included in the transport and logistics model.

Gas Treatment Plant (GTP). The gas treatment plant will be constructed on the North Slope. Construction activities involved with GTP include all equipment, material, field labor costs in addition to consideration of variable locations for modular construction of major GTP segments.

Operational and maintenance activities. To operate and maintain the pipeline and pipeline facilities, a workforce will be needed at several predefined locations. At some facilities personnel will be located onsite; at other facilities, employees will not be needed onsite. Also, staff will most likely visit these sites on a periodic basis for inspection, routine maintenance and other operational activities. Monitoring the pipeline and the pipeline facilities will occur on a perpetual basis. Furthermore, seasonal and/or temporary work will most likely be required to maintain the access roads and perform surveillance on the pipeline.

MODEL ASSUMPTIONS AND DEFINITIONS

Economic assumptions. The model's economic assumptions are reflective of both the Alaskan economy and overall US economy. The most critical assumption within this model is the relative potency of the Alaskan economy and how it has evolved since the construction of TAPS. Without question, the labor markets within Alaska today, as compared to the labor markets within Alaska during TAPS, are much stronger and more viable. Consequently, the capacity of the Alaskan economy to internally absorb the employment impacts from construction of the proposed gas pipeline has significantly increased. This means the economy in the state is poised to both take advantage of the positive economic impacts of gas pipeline construction as well as to assume greater risks with any potential negative impacts from the pipeline.

Of great influence to this model is the assumption that the state of Alaska will prioritize minimizing the influx of out-of-state, non-specific job seekers and/or maximizing the hiring of Alaskan resident workers. This assumption is achieved primarily on two accords:

- High-skills job training for Alaskan workers to maximize the opportunities for Alaskans.
- Media campaigns by the state, the Sponsor Group and major sub-contractors advising residents of other states that gas pipeline construction will rely predominantly on skilled Alaskan workers, and discouraging speculative migration to Alaska for non-specific pipeline jobs.

Prediction of the state of the national economy and the state of the Alaskan economy when construction of the pipeline commences is not part of this model. Variations in unemployment, interest rates and inflation are understood to impact this model accordingly.

Model assumptions. The model assumptions relevant to this project are represented by the modular structure of the project and the concurrent use of IMPLAN. The input variables in this model are based upon the expenditure data provided by the applicants.

Functional costs are assigned to communities/regions based upon their current economic and demographic structure. When analyzing the Alaskan economy as a whole, the relative strength of each local economy is assessed with regard to local industry dominance, workforce, geographic location, and among other parameters. Furthermore, each module is separated into both principal or primary impact regions and support impact regions. The model is built in this fashion because the greatest impact of construction of the gas pipeline will initially occur at the physical geographic location of the expenditure activity. For example, communities directly impacted by transportation expenditures via ports of entry will be impacted differently than those communities through which the actual pipeline passes.

The flow of labor fulfillment begins within the principal region and then radiates out to the respective support region, ultimately streaming to the in-migrant/out-of-state hire supply of workers. This satisfies the assumption that Alaskan workers will not only be priority-hires within this project, but also indicates the robust nature the Alaskan economy by its ability to supply high-skilled labor from other segments of the existing regional in-state economies.

Both the direct and indirect jobs created by construction of the gas pipeline are reasonably assumed to be of a similar higher-skill and higher-wage nature; consequently, Type I jobs which include both direct and indirect are quantified in this model because they will have similar wage demographics.

Induced jobs created within the model are assumed to be relatively lower-skill and lower-wage jobs. Moreover, the intrastate movement of wage earners between regions will be comparatively less than the movement generated by the Type I jobs because of the inherent demographic of traditional induced job workers.

Model definition. In this project, model definition refers to both the specific number variables that are input into our model and the overall conceptual flow of the model. In accordance with the signed confidentiality agreements, the expenditure data is broken-down into Information Insight's definition of the five modules of primary impact:

Module 1: Construction

- **Pipeline corridor/primary region**: The pipeline corridor, defined as those regions in which the pipeline will physically be constructed: North Slope Borough, Yukon-Koyukuk, Fairbanks North Star Borough, Southeast Fairbanks Census
- **Support region**: All other applicable Municipal Advisory Group regions: Anchorage, Haines-Skagway, Kenai Peninsula Borough, Mat-Su, Valdez

Module 2: Pipe coating

- Pipe coating may occur either in the pipeline corridor or in the support region, depending upon commercial decisions made by the Sponsor Group. The current Sponsor Group conceptual plan is not herein disclosed, but the actual impact has been incorporated in model.

Module 3: Transport and logistics

- **Primary region**: Includes any rational ports of entry for freight and the subsequent potential transportation routes for supplies, equipment, and labor within the state and along the Pipeline Corridor (North Slope Borough, Kenai Peninsula Borough, Anchorage, Haines-Skagway, Valdez, Fairbanks North Star Borough)
- **Support region**: All other Municipal Advisory Group communities

Module 4: Gas Treatment Plant

- **Primary region**: North Slope Borough, as already disclosed
- **Support region**: All other Municipal Advisory Group communities

Module 5: Operations and maintenance.

- This module is primarily relevant to the post-construction activities of maintenance that will occur along the Pipeline Corridor communities and at the GTP facility.

The following conceptual map of Information Insights' model displays a visual representation of the construction module (Module 1) and the transport and logistics module (Module 3), as defined above. As mentioned in the model definition above, modules one and three have a primary impact region and a support region. Inherent in this model is the notion, especially with regard to construction and transport & logistics, that the further away the activity takes place from primary municipal designation and/or impact, the smaller the relative economic impact within the relevant support region.

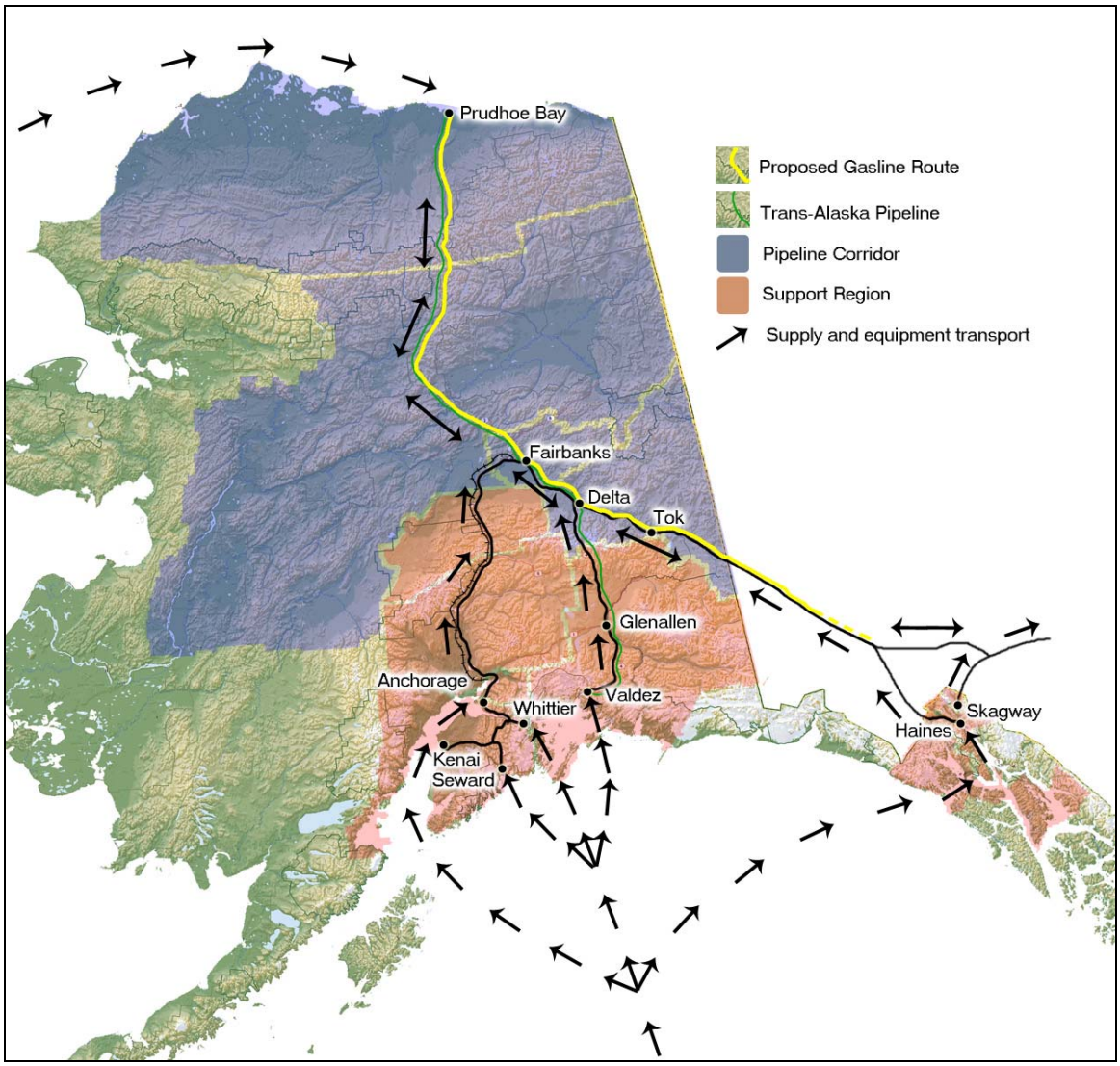


Figure 17: Conceptual map showing pipeline construction and logistics model assumptions

Employment model chronology

- Estimated direct, indirect, and induced jobs via IMPLAN.
- Labor force estimates are quantified by the seasonal unemployment figures for winter and summer of each specified region.
- Full employment is assumed to be five percent of available labor force.
- The percentage of the regionally unemployed labor force that will supply the Type I impact jobs for construction of the gas pipeline is assumed to be seven percent of the available unemployed, representing half of the unemployed construction work force.
- The percentage of the regionally unemployed labor force that will supply the induced impact jobs for construction of the gas pipeline is assume to be 20 percent of the available unemployed

- There exist two distinguishing job numbers:
  - Jobs created in the region: These are jobs that are required within or jobs that will physically take place within the geographic region of impact.
  - Jobs fulfilled by the region: These are jobs that are supplied by the regional labor market, relative to its size and absorptive capacity.
- New jobs created within the community were calculated by subtracting the total of jobs taken by the unemployed from the total new jobs created.

Population model chronology

- Population figures were gathered from US Census data from 1970 to present.
  - Inherent year-to-year growth rates were calculated with particular note to TAPS years of construction and post-TAPS construction growth rates.
- Unemployment figures were gathered from 2003-Q3 and 2004-Q1 to represent the seasonal employment changes within the Alaskan community.
  - Subsequent employment numbers were calculated using the seasonal unemployment rates and the total employment figures.
- Via our economic impact model, direct, indirect, induced and total impacts were calculated. From these impact figures, the percentage change from total baseline employment within the Municipal Advisory Group communities was calculated.
- Assuming full-employment in Alaska is no less than a five percent unemployment rate, for each community the difference between the winter unemployment rate less the base unemployment rate multiplied by a factor of the number of employed in the summer gives us an indication of induced jobs that are taken up by the unemployed. These are inherently employment jobs that would be of secondary impact and not as highly skilled as the direct hire jobs.
- Based on the percentage of unemployed workers from the construction industry (14 percent in the winter), and an assumption that 50 percent of these workers would be available, on average, at any given time over the course of the year, we calculated the proportion of direct and indirect jobs that could be filled from the existing workforce in the community. Construction employment is predominantly seasonal employment –construction workers may be able to work six months out of the year, even though their pro-rated hours per week during their employment season is much higher than the traditional 2,080 hour work year.
- Where there remained capacity in the existing community workforce to fill induced, direct or indirect jobs (using the methodology detailed above), we assumed these workers would fill jobs available elsewhere in the state, migrating or commuting to the work community.
- This process demonstrates that basically all induced jobs, generally of a lower skill level, could be filled by the existing unemployed Alaska workforce. Nearly 50 percent of skilled jobs, however, would require importation of labor from outside the state. Clearly a targeted workforce development program could improve the proportion of jobs that could be filled by Alaska residents.

- New jobs created within the community were calculated by subtracting the total of jobs taken by the unemployed from the total new jobs created. Fifty percent of those new jobs created within the community, not filled from within the community or by commuters from elsewhere in the state, are assumed new residents, while the remaining 50 percent of the new jobs not filled by Alaskans are assumed filled by commuting non-residents.
- New population was formulated by multiplying the new jobs held by former nonresidents living in Alaska by a factor of the number of people per job in Alaska, representing the average household size.

MODEL RESULTS

Construction and GTP. This model projects an Alaska hire ratio of approximately 50 percent of Type I jobs and assumes virtually all induced jobs will be filled by Alaskans. Further model results indicate there will be 6,479 Type I jobs created per year and 2,086 induced jobs created per year due to the pipeline construction project (pipeline, compressor stations, and transportation and logistics supporting this construction). An additional 580 Type I jobs, and 162 induced jobs will be created per year by the construction of the gas treatment plant. In summary, there will be an estimated total of 9,307 jobs…of which 7,059 will be Type I and 2,248 will be induced job.

These figures do not include U.S. military employment impacts, even though the federal military is a substantial employer within the state of Alaska. The following table summarizes these estimates.

Estimated Employment Impacts	Total Per Year	Gas pipeline Project Total	GTP Total
Baseline Employment	318,368		
Type I Impact (Direct + Indirect)	7,059	6,479	580
Induced Impact	2,248	2,086	162
Total Impact	9,307	8,565	742
Percent Change in Type I	*2.7 %*	*2.0 %*	*0.18%*
Percent Change in Total	*2.9 %*	*2.2 %*	*0.71 %*

Table 21. Employment impacts

Operations and maintenance. In comparative terms, the operations and maintenance segment induces a fairly small economic impact over the operational life of the project. Because GTP operations and production and exploration activities will occur on the North Slope, the NSB will incur the lion share of this impact. Type I jobs created during the post-construction activities involving operations and maintenance total 450 jobs per year, with an additional 215 induced jobs per year. Overall, about 665 jobs are required per year for maintenance of the pipeline, the pipeline facilities, and the GTP. This workforce will be required at several predefined locations, most likely the GTP facility

and the compressor stations. Also, additional staff will be needed to supervise inspection and routine maintenance activities. Furthermore, additional impacts could potentially include construction of supplementary compressor stations within the existing Pipeline Corridor communities in order to increase the throughput and/or pressure of the gas. Obviously, when additional compressor stations are built, more labor will be temporarily needed during construction with additional maintenance personnel need upon completion.

The socio-economic impacts of major consequence regarding post-construction operations and maintenance are primarily in the subsistence and socio-cultural effects that will take place over time. Economic impacts of post-construction operations and maintenance of the gas pipeline system are minor and are not anticipated to create problems for local governments.

CONTINGENCIES AND COST OVERRUNS

The data provided from the Sponsor Group is nearly four years old, rendering many of the economic assumptions regarding project cost uncertain. Significant change can also be anticipated between 2004 and the commencement or project construction. Changing economic conditions are likely to yield

- Variance in wage rates
- Variance in unemployment rates for construction and other workers
- Variance in the price of steel and/or changes in the world supply of integral construction materials. The increased demand resulting from other projected oil and gas pipeline projects around the world could strain an already extremely tight supply of pipe; subsequently causing the price of steel to rise.
- Variance in the price of fuel that directly impacts the transport and logistics modules

Changes in technology within the last three years could significantly impact the productive efficiencies that were previously model assumptions in prior studies – potentially lowering cost and/or labor requirements.

The impact of other potentially significant construction projects within the State of Alaska would undoubtedly impact the labor market conditions if undertaken in conjunction with any of the pre-construction and/or construction period activities of the proposed gas pipeline. The percentage of the in-migrant workforce could grow larger in order to meet the tight labor market demands created under this scenario.

- Alaska Railroad extension to Delta Junction and/or the Canadian border
- Knik Arm Crossing from Anchorage to Point Mackenzie
- Arctic National Wildlife Refuge exploration and development
- National Petroleum Reserve – Alaska development
- Military construction in excess of current levels
- Juneau Road to Skagway
- Other major state transportation projects

Because construction of the natural gas pipeline is occurring in extreme northern climates, inclement weather can potentially force construction lags by delaying equipment arrival and/or manpower.

This impact model, like any other, is constrained by the challenges of predicting the actual relevant economic conditions when construction of the gas pipeline commences. This constraint means that this municipal impact study can be expected to be wrong about one or more of the economic variables that could significantly affect the expenditures – and therefore the municipal impacts – associated with the project.

CAUTIONARY NOTE

Alaska's population includes many residents who will be able to qualify for jobs during gas pipeline construction (direct, indirect and induced), including some that require specialized craft training. Nonresidents will necessarily fill some jobs, and they will come largely from a pool of highly trained, gas pipeline specialty workers.

By comparison with the TAPS period of construction, Alaska now has a robust economy with a considerably increased in-state capacity to absorb job opportunities. Of critical importance to the impact model is the underlying assumption that the State of Alaska, the Sponsor Group and major contractors will highly prioritize efforts to discourage in-migration of non-specific job seekers. The willingness of people in other states to move to Alaska for work depends in part on local and national economies; at the same time, the TAPS experience shows that efforts needed to begin earlier and be sustained over time with a major, multi-faceted campaign to dissuade migration for pipeline job-hunting.

A huge influx of people whose only reason to come to Alaska would be a speculative job search would overturn this model and would cause significant unanticipated impacts in communities and the state. The kind of in-migration experienced during TAPS (which came at the peak of a national recession) could overburden municipal and state service systems if out-of-state job prospectors did not find work, and could displace people already in the state who would be expecting pipeline-related jobs.

Three major impacts would weigh on the Alaska economy if significant numbers of non-resident workers come to Alaska for the perceived notion of "high-paying, easy-money" jobs.

- The influx of speculative job seekers would decrease the number of job opportunities available to current Alaskans and could displace current workers within the state.
- The arrival of out-of-state, non-specific job seekers would increase the odds that any pipeline-related earnings would flow out of the state – ultimately minimizing the economic benefits of ancillary rounds of spending that occur within the local economies.
- If the State of Alaska were to experience an exorbitant amount of in-migrants the impact upon municipalities would rise considerably on a relative scale (due to lower effect of the income multiplier from the outflow of wage spending, as well as a potential rise in need for social services and unemployment claims).

VI. Socio-economic Impacts

Gas pipeline construction and operations will have a significant impact on Alaska communities, the Alaska workforce, and the Alaska economy. It will be the largest single project in the state since the construction of the Trans Alaska Pipeline System. Tax revenues to state and local governments from gas pipeline operations would also impact communities and their economies.

This study focuses on the socio-economic impacts affecting municipal and village governments in Alaska – more specifically, the "economically affected municipalities" referred to in the Stranded Gas Development Act. The study therefore does not address those socio-economic impacts that do not cause changes in expenditures, or changes in revenues to municipal governments, other than a survey of potential impacts in communities in the unorganized borough.

In total, this study identifies $120.6 million in additional expenditures that would be incurred by municipal and village governments, and by state government in support of municipal education and public safety services. This compares to an estimated $258 million that would be paid in state and local oil and gas production property taxes during gas pipeline construction (with another $138 million due shortly after production begins).

Fiscal Year	**Estimated municipal, village and related state economic impacts** ($ Millions, in 2004 dollars)	**Estimated state and local gas line project property taxes under existing AS 43.56** ($ Millions, in 2004 dollars)
2009	4.5	1.2
2010	16.6	10.5
2011	27.7	44.2
2012	27.7	80.3
2013	26.0	122.1
2014	18.1	138.2
Subtotal	**$120.6**	**396.5**
Less: Net Property Tax Revenues	$ (10.7)	
Total	**$ 109.9**	

Table 22: Estimated municipal impacts and AS 43.56 property taxes, 2009 to 2014

Drawing upon the lessons of TAPS construction, public data provided in the application and confidential data from the Sponsor Group, this report addresses impacts in these categories:

- **Labor force impacts.** How much labor will be required to build the gas pipeline and to support its construction? How much of that labor can be provided from the existing Alaska workforce, how much can be provided by training or re-training the Alaska workforce, and how much labor will need to be imported? *This study estimates an increase of 9,300 jobs per year on average during the construction*

period. In order to maximize opportunities for local hire, and to reduce impacts of population growth due to immigration, workforce development efforts in Alaska communities will require an estimated $6.6 million in new costs over the four years prior to and at the beginning of the project to meet gas pipeline construction needs.

- **Population impacts**. How is the population of Alaska likely to change during and after gas pipeline construction, both statewide and regionally? How much of that change is attributable to the gas pipeline project? What costs for municipal services will be required to meet the population changes? *This study estimates Alaska population will increase by 9,400 – 10,400 during the entire period of pipeline construction, adding $38.1 million in population-induced costs to municipalities over the construction period.*
- **Infrastructure impacts**. What new infrastructure – roads, highways, railroad, ports, airports and utilities – will be required to be provided by governmental entities prior to commencement of construction? What new traffic loads will be created during construction and how will they affect the infrastructure and other users? What will be the impact on maintenance of infrastructure during construction? How much deterioration of infrastructure can be expected during the construction process? *This study estimates $19.1 million in economic impacts to municipalities and villages for infrastructure during gas pipeline construction. In addition to this municipal impact, $284 million in new state highway and port projects will be required in advance of gas pipeline construction. Absent new funding for these projects, if federal highway aid is used to support the pipeline-related transportation infrastructure, existing projects on the State Transportation Improvement Plan (STIP) will be delayed up to a year to accommodate these projects. Additional infrastructure repair costs are likely to be required after construction is completed.*
- **Law enforcement and emergency services impacts.** How will population changes impact crime rates and law enforcement in Alaska municipalities and villages? What changes in fire protection, ambulance and medical evacuation may be required to address gas pipeline construction impacts? *This study estimates $25.9 million in municipal law enforcement and emergency services impacts during gas pipeline construction, including $5.8 million in new state trooper coverage.*
- **Health and human services impacts.** How will the project impact the Alaska health care system, including municipal hospitals and village health clinics? What changes in social service demands will impact local communities? Most health and human services in Alaska are provided by state and tribal programs, and not by municipalities. *This study estimates $4.9 million in municipal health and human services impacts during gas pipeline construction. Additional health and human service impacts will need to be addressed after construction is completed.*
- **Education impacts.** How many new children will enter Alaska schools as workers and their families move into the state to fill needed jobs or to search for jobs? Which communities will see changes, and will the magnitude require construction of new schools in any communities? *This study estimates $3.4*

million in local support for K-12 education will be required during gas pipeline construction. In addition, the State of Alaska will also see an increase of $15.1 million in the public school foundation formula from the increase in K-12 students.

- **Wage impacts.** How will the project affect wages generally, and in particular, how will wage impacts affect municipal and village governments? What changes in municipal administration and support will be required? *This study estimates wage impacts for municipal operations of $11.2 million during the pipeline construction period. Municipal capital spending during pipeline construction will also be affected, but is not included in this analysis.*
- **Subsistence and socio-cultural impacts.** How will the project affect abundance of subsistence resources, access to subsistence resources, and quality of subsistence resources? What will be the changes in fish and wildlife population dynamics? How will changing local economies affect the subsistence economy? What planning, research and remediation will be required? *Estimating financial costs for subsistence and cultural impacts means applying quantitative methods to primarily qualitative circumstances. This study takes the approach of estimating costs for planning, monitoring and evaluating subsistence impacts, with mitigation of certain impacts during construction, at $11.5 million. The costs and restitution required for catastrophic impacts have not been calculated but will need to be addressed in an EIS process.*
- **Cumulative impacts.** The presence of a gas delivery system will bring new exploration and development of gas resources in the vicinity of the project. What will be the cumulative impacts of gas commercialization on the North Slope? How will new activity cumulatively affect the subsistence resources and economy of the North Slope? *A comprehensive treatment of this complex issue is far beyond the scope of this study, but cumulative impacts cannot be ignored at the commencement of this project. This study identifies some of the major issues, but as with construction impacts on subsistence, does not address costs or restitution for most cumulative impacts. It does estimate costs of an ongoing subsistence monitoring and evaluation process, adopting an endowment approach at a cost of $5 million.*

Impact area	Estimated municipal and village economic impact ($ Millions, in 2004 dollars)	Estimated state impact for support of municipal and village impacts and for infrastructure requirements ($ Millions, in 2004 dollars)
Population-based service impacts	38.1	0.0
Labor force development	6.6	0.0
Infrastructure	19.1	0.0
Law enforcement/emergency services	20.1	5.8
Health and social services	4.9	0.0
Education	3.4	0.0
Municipal wages	11.2	0.0
Subsistence and socio-cultural	11.5	0.0
Subtotal	**114.7**	**5.8**

Table 23: Summary of economic impacts during gas pipeline construction

TIMING OF IMPACTS

The timing of socio-economic impacts is a critical factor and a major component of assessing the construction impacts of the pipeline. The most important element related to the timing of the impacts occurs because the socio-economic impacts realized by the communities are experienced well before any remuneration of tax receipts from an increased tax base are collected. Possible impacts include increased school population, the need for extra police, firefighters and medical-care givers. The communities affected by these immediate and sometimes-costly impacts are subsequently impacted by these strained social services. Via impact funding, the State pays for some of these municipal-specific impacts. This impact funding provided by the State can garner support for potential early tax breaks on a project and facilitate the absorption of the economic impacts upon the municipalities.

LABOR FORCE IMPACTS

Construction of a gas pipeline that traverses more than 700 miles in Alaska is a project of such immense scale that it is difficult to know what the true impacts will be until the project has begun. We can, however, look to the Trans Alaska Pipeline experience for wisdom. One of the most important and positive impacts of the proposed gas pipeline on Alaska will be the employment created during the construction and operation phases of the project.

Demand for employees working directly on construction of the gas pipeline will occur primarily in the winter months. While there will be employment demands at a moderate level during all months of the year, the vast majority of workers will be required during

the months of January, February and March. During the second and third years of construction there will be moderately high demand for trade workers in the summer months as well as high demand in the peak winter months.

The series of graphs below demonstrates the impact of the pipeline project on Alaska construction employment. The first graph demonstrates the seasonality of existing Alaska construction employment, which in 2003 peaked at just over 20,000 in August, compared with a January low of approximately 12,500.

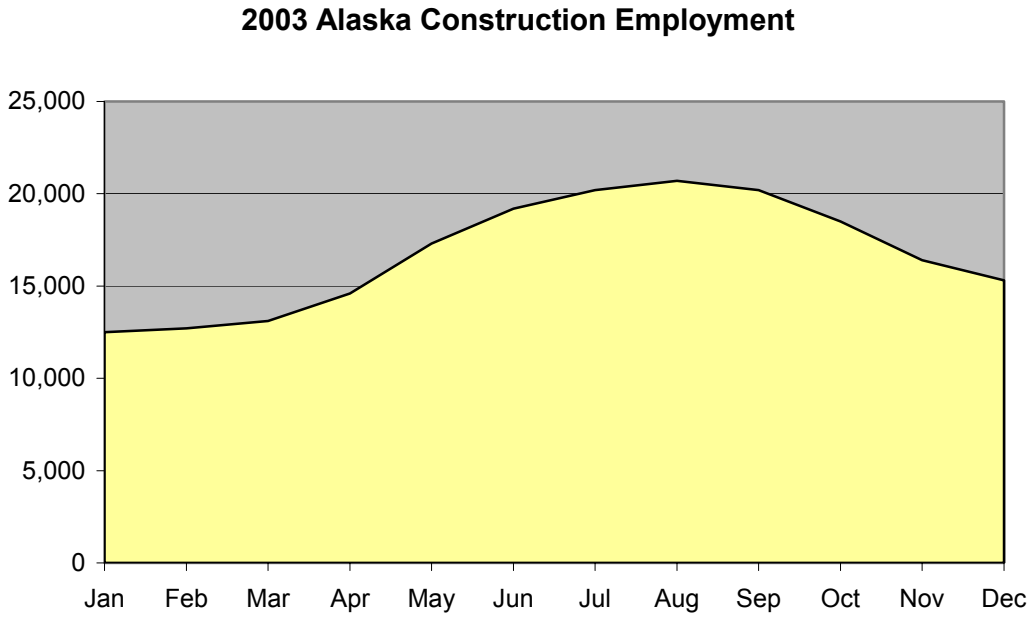


Figure 18: 2003 Alaska construction employment

The next graph is based on one produced by the Sponsor Group showing seasonality of craft demand by month for each of the three years of the entire pipeline project. Assuming the Alaska portion has the same timing of seasonality overall, craft demand for each of the three-plus construction years would be as follows, with the construction year based on the assumptions listed earlier in this report:

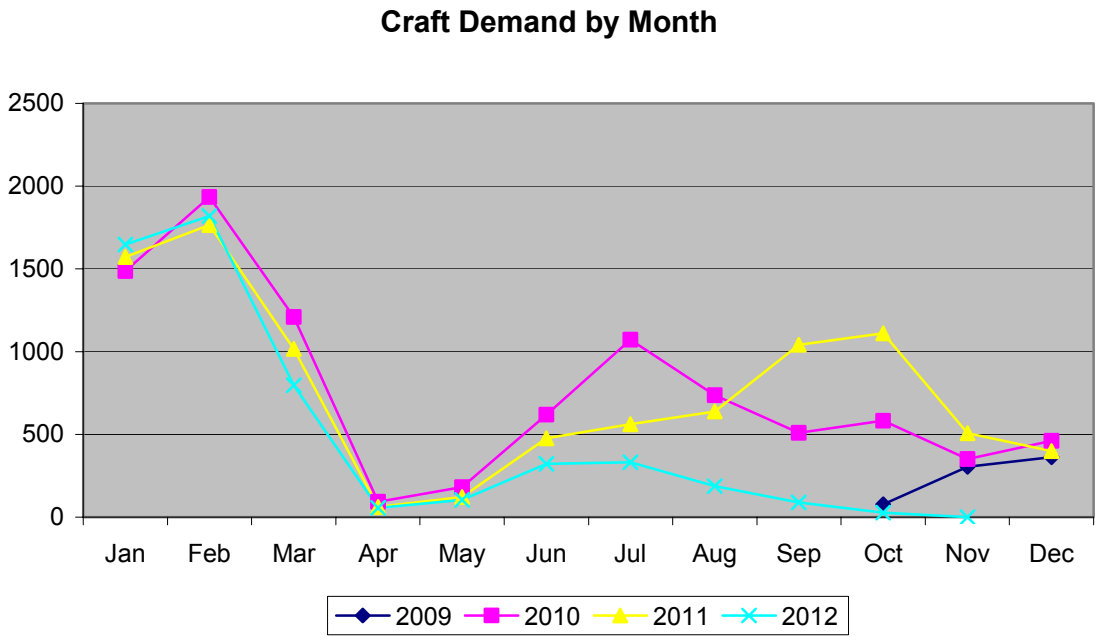


Figure 19: Gas pipeline craft demand by month

Taking a sample year of 2010, and aggregating its workforce demand with the most recent full year of 2003 yields a new total demand for employment that would look as follows. It appears that there are significant opportunities for local hire during peak seasons, provided that the skills needed by the project are available in the Alaska workforce.

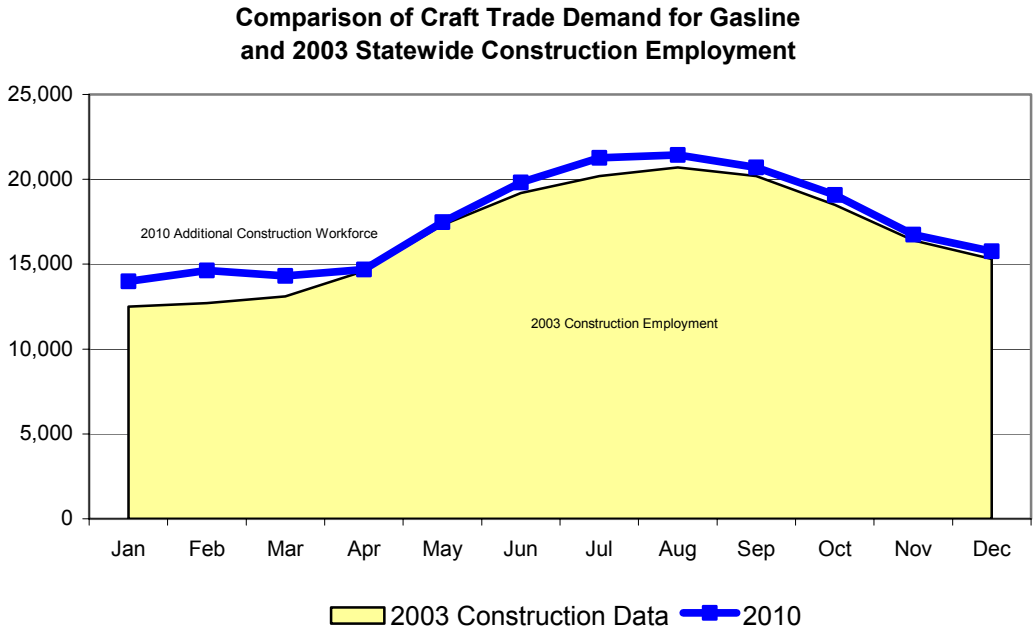


Figure 20: Aggregate craft and construction demand by month

Total craft trade manpower needed for the construction phase of the gas pipeline project is broken down by trade and displayed in the table below:

Trade	Projected Employment, entire gas pipeline	Estimated Employment: Alaska segment only
Welders/Helpers	1,650	565
Operators	2,000	685
Surveyors	135	46
Laborers	1,250	428
Teamsters	755	258
Inspectors	418	143
UT Technicians	90	31
Salaried Foreman	170	58
Total craft labor	**6,468**	**2,214**

Source: The Sponsor Group; Information Insights, Inc.

Table 24: Estimated craft trade manpower needs

The construction industry in Alaska is highly seasonal with the majority of work performed occurring in July, August and September. The graph below reflects the 2003 construction season and counts construction jobs in each month. In 2003, there were 8,200 fewer jobs in January than August.

In 2000, 7.3 percent of the workforce in Alaska reported being employed in the construction industry. This is significantly higher than the 5.2 percent rate of construction industry employment reported nationally.

In 2002 an average of 16,000 people worked in the construction industry, while 35,000 reported they received at least some of their yearly income from construction work. At least 28,000 people received the majority of their income from construction work.

Union	Active Members
Boilermakers	30
Bricklayers & Blocklayers	65
Carpenters	1,383
Cement Masons	150
Electricians	4,500
Elevator Workers	49
Heat & Frost Insulators/Asbestos Workers	104
Iron Workers	297
Laborers	3,000
Painters	380
Piledrivers	211
Plumbers	811
Power Equipment Operators	3,319
Roofers	65
Sheet Metal Workers	350
Truck Drivers/Surveyors	6,426
Total	**21,140**

Table 25: Active membership in craft and trade unions, 2003

During 2002 and 2003, the construction industry increased employment by 5.7 to 6 percent each year.

The construction industry in Alaska provides more than 20,000 jobs in over 160 separate occupations, as defined by Alaska Department of Labor and Workforce Development (DOLWD). The department lists 75 major occupations in the construction industry, roughly distributed as follows:

- 70 percent of employment in the construction industry occurs within the occupational category of Construction and Extractions
- 53 percent of all construction jobs are in the Specialty Trades
- 30 percent are in Building
- 17 percent occur in Heavy Construction and Civil Engineering

Within the above occupational and industry categories there is further concentration, with 46 percent of all employment occurring in five occupations:

- Carpenters
- Electricians
- Construction laborers
- Operating engineers and other construction equipment operators
- Plumbers, pipe fitters and steamfitters

One tenth of all wages paid in Alaska go to nonresidents. In 2002, nonresident workers comprised 18.2 percent of all workers statewide. The construction industry saw a non-resident hire rate in 2002 that was more than 20 percent. Oil and Gas has a higher non-resident hire rate than any other industry in the state. It is clear that there will be people brought in from out of state to fill key positions in the construction phase of the gas pipeline such as the specialized welders who do not exist in the state in numbers large enough to fulfill demand.

There are however, many construction workers in other crafts who are also Alaska residents that should have the opportunity to fill needed positions during construction. Additionally, affected municipalities are willing and able to work with industry and state to provide the training necessary so that residents of their communities are prepared to be able to offer the workforce demanded of the project – not only during the construction phase but also during operation. In 2002 construction workers in Alaska claimed residence as follows:

- Anchorage/Mat-Su – 42.9 percent
- Fairbanks – 11.5 percent
- Kenai – 7 percent
- Juneau – 3.1 percent
- Rural – 15 percent
- Non-Resident – 20.4 percent

Training Alaskans to fill positions in industries with high rates of nonresident workers is recognized as an important task by state government. The State of Alaska provides State Training and Employment Program grants for this purpose. Additionally, Alaska DOLWD works in cooperation with the Alaska Workforce Investment Board (AWIB) to promote and plan for an increase in the rate of resident hire. AWIB is committed to the idea of helping Alaskans get "good jobs," defined as those that provide economic independence with a living wage.

We can maximize benefits to Alaska of increased employment and decreased stress on government provided social services and unemployment services. This mechanism delivers the full impact of economic development activities because a larger portion of wages remain and can be spent within the state. Assuring that Alaskans have access to full employment and good jobs has two important impacts:

- Increased economic activity in the state
- Reduced reliance on human and social services programs paid for by state and local governments

The Municipal Advisory Group's resolution on Alaska Hire advises the state to require that project sponsors provide plans and benchmarks for hiring and training qualified Alaskans, and to offer incentives accordingly. The resolution also requests implementing collection of statistical information to verify appropriate levels of training and hiring Alaska workers and subcontractors.

Table 26 displays programs for training selected craft trades in Alaska.

Trade	Project Demand	Training Timeline	Programs in Alaska
Welders	1,650 welders and helpers (565 on Alaska segment)	2 to 4 years average and 6,000 hours hands on training	▪ TVC: A.W.S. welding certification ▪ AVTEC: Pipe Welding, 7 completers 2002 ▪ AVTEC: welding technology, 38 completers 2002 ▪ Anchorage, UAA, welding, 26 completers 2002 ▪ Kenai: UAA, Welding, 10 completers 2002 ▪ Ketchikan: UAS, welding, 1 completer 2002 ▪ Sitka: UAS, welding, 2 completers 2002 ▪ Union boilermakers in Washington ▪ Testing institute of Alaska: gas welding, 4; welding/pipe, 33; welding, 14
Teamsters	755 (258 on Alaska segment)	3 yrs and 3000 hrs OJT	▪ Seward: AVTEC, advanced drivability, 64 completers in 2002 ▪ Anchorage: Center for Employment Education, Construction Driver Tech, 3 completers 2002 ▪ Anchorage: Center for Employment Education, Driver Training, 62 completers 2002 ▪ Barrow: Ilisagvik, Heavy Truck Operations, 20 completers 2002 ▪ Anchorage: Teamsters Training Center, completed 7 in last 5 years
Laborers	1,250 (428 on Alaska segment)	3 to 4 years, 4,000 hours OJT	• JATC Laborers, 52 completers in 2002
Operating Engineers:	2,000 (685 on Alaska segment)	4 years, 4,000 OJT + 8 wks other voc training	• Anchorage: JATC Operators, 235 completers in 2002 • AVTEC, Intro to Heavy Equip Operation, 37 completers in 2002 • Barrow: Ilisagvik, Heavy Equip Operators, 20 completers 2002 • Barrow: Ilisagvik, Heavy Truck and Equip Opera, 11 completers 2002
Inspectors	418 (143 on Alaska segment)		• AVTEC: Inspection/ maintenance, 237 completers 2002
Surveyors	135 (46 on Alaska segment)	4 years, 4,000 hours OJT	• Anchorage, UAA, survey and mapping, 19 completers 2002

Table 26: Alaska workforce training programs for select craft trades

POPULATION IMPACTS

When an industry and/or sector is created or added to a local economy, the direct impacts appear self-evident with regard to direct employment. However, when assessing population growth on a local community where a large project is being undertaken, the population growth in a new community is simply not just the worker. The final estimated economic impact with regard to population would be the sum of the traditional population growth rate trended by historical data, plus the direct, indirect and induced

employment impacts. Furthermore, the question of whether an employee moves their family to the impact region would significantly alter the population growth. Important concerns are as follows:

- What is the demographic breakdown of the "pipeline" worker?
- Of the direct employment, how many workers will be in-migrant workers from other communities within the state?
- Of the direct employment, how many workers will be from out-of-state?
- Because of the seasonal work, will the workers move their families to the region of impact?
- After project construction ceases, what percentage of the estimated new population growth will remain a permanent part of both the Alaskan economy and population? Will "pipeline" workers and their families leave if no new work is found? Will a newly trained, more highly skilled workforce have better opportunities finding post-construction employment? Will there be a "let-down" effect and/or displacement of the "pipeline" workers due to the potential lag time in finding future employment opportunities? If the number of federal projects continues to decrease and this decline is concurrently met with a post-construction labor "let-down" effect, will this occurrence exacerbate, in either direction, the economic momentum? While this issue is of important note to municipalities, its analysis is outside the scope of this particular study.

When assessing the impact of population growth on an impact region it is critically important to look beyond the sum of the historical growth rate and total employment impact. More importantly, the demographic characteristics of the community combined with the in-migrant composition of that community, could profoundly alter the estimated degree of impact.

This study estimates that just over 9,300 new jobs will be created on an annual basis as a result of the construction of the pipeline and gas treatment plant. The majority of these jobs – 7,700 – are skilled crafts and project subcontractor staff; another 2,100 are induced jobs. The study projects that approximately half of the skilled craft and project subcontractor jobs can be filled with available in-state workforce, and virtually all induced jobs can be filled with available in-state workforce. The remaining influx of workers, some of whom will bring families, yields an estimate of population increase for the impacted Municipal Advisory Group communities in the range of 9,400-10,400 in-migrants.

INFRASTRUCTURE/TRANSPORTATION

Although many details of the proposed gas pipeline project remain confidential, the proposed route allows assumptions about areas of impact to transportation systems. It is likely that all types of transportation systems within the state will have impacts due to:

- Size and weight of loads necessary to move pipe and compressor stations
- Volume of direct traffic for hauling pipe and equipment

- Increased traffic on ancillary routes impacted by increased population and economic activity
- Dust mitigation for increased population and activity in smaller communities' roads
- Port improvements to allow pipe unloading, laydown and unloading
- Dredging if required to allow barge access to Prudhoe Bay
- Railroad improvements to address size and weight of loads moved.

Alaska Department of Transportation and Public Facilities has responsibility for the state's transportation systems. The Federal Highway Administration (FHWA) provides the primary source of funds for surface transportation projects in Alaska. Other key funding includes transit funds from the Federal Transit Administration (FTA) and designated funding from Congress for specific projects. Each category of funding has specific rules for project eligibility, match ratios and other program issues. The funding sources require a State Transportation Improvement Plan (STIP) for all areas of the state outside of metropolitan planning areas. There are two MPA's in the state – Fairbanks and Anchorage - where Transportation Improvement Programs are developed and approved by the state and incorporated into the STIP.

The STIP is the state's plan for allocating funding for surface transportation. The plan has several categories, with each receiving a portion of the funds:

- National Highway System includes the most important highways and ferry links that connect the state's population centers with economic centers, border crossings and inter-modal facilities.
- Alaska Highway System (AHS) is the system of state highways, roads and ferry links that were not made part of the National Highway System but are still important to the state to link cities with economic centers and recreational areas, and to span the distances between cities.
- Community Transportation Program creates partnerships with local governments, tribes and other entities to build projects serving local and regional needs, including economic development projects.
- Trails and Recreational Access for Alaska projects improve access to recreational facilities and provide trails for transportation and scenic improvements along highways.

Potential impacts to the National Highway System. The proposed project requires 732 miles of high-density steel pipe plus many loads of heavy equipment and construction supplies. Existing Alaska infrastructure for highways, bridges and ports requires upgrading prior to the commencement of construction. Roads, highways and bridges will need improvements to bear the dense loads; port upgrades will facilitate off-loading of heavy pipe.

The Sponsor Group and Alaska DOT/PF have identified a series of highway and port construction projects that are important to the project prior to construction commencement. Other highways that may be used, such as the Klondike Highway from

Skagway to Whitehorse, do not require upgrades to handle the heavier truckloads. The project upgrades required include:

Location	Type of Upgrade	Cost – identified by DOT/PF in 2001 dollars
Dalton Highway (Roads)	Highway improvements between Livengood and Prudhoe Bay	$90,920,000
Elliot/Steese Highways (Bridges)	Address clearance and load-bearing issues	$4,081,000
Richardson (Bridges)	Bridges between Fairbanks & Delta Junction	$28,000,000
Richardson Highway (Road)	Highway improvements	$22,300,000
Alaska Highway (Bridges)	One major bridge replacement, several smaller upgrades	$52,200,000
Alaska Highway (Roads)	Highway improvements	$8,000,000
Glenn/Parks Highways (Bridges)	One overpass and several bridge upgrades between Anchorage and Fairbanks	$20,484,000
Haines Highway (Bridges + Road)	One bridge replacement, highway improvements	$36,500,000
Port of Haines	Port improvements	$3,000,000
Total		**$265,485,000**
Convert to 2004 dollars		18,410,000
Total		**$283,895,000**

Table 27: Major highway improvements needed for project

These upgrades to state infrastructure could be funded within the surface transportation funding structure, although not without impact to other existing transportation projects. If all projects fell within federal aid guidelines and were eligible for federal funding, the State of Alaska would then have to provide as its portion of the projects the required ten percent match, or $28.4 million (2004 dollars). This funding would be required almost immediately upon project/application approval to allow the necessary upgrades to be completed prior to construction. The approved 2004-06 schedule does not appear to include the above referenced projects, although project descriptions provided (i.e. Richardson Highway – road) make it difficult to ascertain with certainty.

Federal funding for surface transportation projects has declined in the last two fiscal years, and lower than anticipated funding levels have already lead to a large number of projects being delayed. Current estimates of all categories (excluding earmarks) of surface transportation funding used in the preparation of the STIP are 2004: $340.0 million; 2005: $340.0 million; and 2006: $382.0 million. The regulations governing the STIP require that the list of projects must be balanced against the most likely level of

federal funding. There is however, a current large backlog of transportation requests, both designed and ready to start that dwarfs the current federal funding sources available. Absent specific earmarks for the transportation projects outside the STIP process or significantly increased levels of federal funding, adding $284 million in projects would displace existing projects in the STIP and further exacerbate an existing problem.

The Municipal Advisory Group has clearly stated that the projects needed prior to gas pipeline construction cannot displace road projects of high importance to municipalities and other entities across the state. This issue must be considered when evaluating the timing and funding sources of all projects.

Major routes. Final decisions about routing goods and materials for the proposed project, including pipe and compression stations, will be made later in the process—some by suppliers and vendors. Given the proposed pipeline location, the movement of goods and materials must take place over the existing, limited surface transportation network.

Pipe for the project will be manufactured outside Alaska and delivered to one or more Alaska ports. It will be off-loaded, then loaded to railroad cars or trucks for delivery to a pipe coating and storage yard. After coating, the pipe sections will be re-loaded to trucks and delivered to the construction area. Construction equipment will be trucked up the Alaska Highway, or will arrive at one or more Alaska ports and shipped by rail or truck to where the equipment will be used. Increased volumes of supplies and goods will enter Alaska via traditional methods of ship, truck and air. A hypothetical map of movement in the Fairbanks area is shown on the next page.

We anticipate significant additional infrastructure use in the following locations:

- Alaska Railroad, Seward, Anchorage and Whittier to Fairbanks (pipe, portions of compression stations and equipment)
- Port of Anchorage, trucked to pipeline construction areas via the Glenn Highway and Parks Highway to Fairbanks, or Glenn Highway, Richardson Highway and Tok Cutoff to Glennallen (equipment, portions of compression stations and supplies)
- Anchorage arterials, trucking of equipment and supplies
- Port of Whittier, shipped by rail / truck to construction sites (equipment / supplies
- Fairbanks area pipe yard, trucked via the Steese / Elliott / Dalton Highways to pipeline construction areas, or via the Richardson / Alaska Highways to pipeline construction areas (pipe and equipment)
- Fairbanks industrial area, trucking of equipment and supplies on all arterials
- Prudhoe Bay barge delivery, trucked via the Dalton Highway to pipeline construction areas (pipe, equipment, compression stations)
- Port of Haines, trucked via the Haines Highway to Haines Junction, and Port of Skagway, trucked via the Klondike Highway to Whitehorse (pipe for Canadian portion of pipeline)
- In addition, if modules for compression stations are built in Alaska, barge traffic to and from Kenai and Anchorage. There will be increased traffic on the Seward Highway, possibly transiting Anchorage to the Glenn Highway.

The responsibility for maintenance of nearly all of these roads and infrastructure falls on the State of Alaska. This study does not include costs for maintenance and rehabilitation of state transportation infrastructure.

Prudhoe Bay. Depending upon the size and weight of barge loads in sealifts to Prudhoe Bay, new dredging or "cleanup" dredging may be required. Any offshore dredging activities have the potential for significant impacts on subsistence resources, and timing of activities is critical. Dredging timetables are affected by seasonal ice movement and whale migration. Public statements have indicated the Sponsor Group plans to avoid sealift and barge activity that would require additional channel dredging.

North Slope. Any gravel pads or roads constructed for the gas treatment plant, gas pipeline, or gathering lines, will require local gravel. Gravel is a scarce commodity on the North Slope. North Slope oil development has already consumed significant quantities of gravel, leaving few easy choices to gas pipeline and gas treatment plant constructors.

The following data was primarily referenced from the *Northeast National Petroleum Reserve – Alaska, Draft Amended IAP/EIS* report from June of 2004. North Slope oil development has resulted in approximately 1,280 acres of gravel mines, leaving a total gravel footprint of 9,640 acres. When undertaking a vast construction project in the arctic tundra, the development area must not only be raised above the wet tundra surface, but also be on an extremely level gradient. The development area and/or pads are primarily made of gravel and serves as the main foundation for wellheads, production and support facilities, infield roads, and airstrips. A common requirement for any development pad within this particular arctic landscape is a five-foot elevation in order to mitigate the unbalanced tundra plane, and to protect against summer flooding and winter ice jacking.

Relative gravel procurement will principally depend upon the particular conditions of the development site and the site's relative proximity to gravel origin. Because gravel is a scare commodity on the North Slope, the following alternatives are listed within the *NE-NPR-A, Draft Amended IAP/EIS* (June 2004) as possible strategies for fulfilling the projected gravel supplies[9]:

- Extracting gravel from existing sites
- Developing new sand and gravel mine sites within "development" area
- Barging construction materials to coastal staging areas
- Processing bedrock for construction materials
- Designing alternatives: year-round ice pads, composite all-season pads
- Reusing gravel from previous drill sites

For upstream operations, because the nature of these operations requires more permanent production facilities, the following dimensions give an estimate of the typical gravel requirement in pad construction:

[9] Northeast National Petroleum Reserve – Alaska: Draft Amended IAP/EIS, June 2004 – page 4-23.

The following table estimates the area of surface disturbance and the amount of gravel needed for oil and gas facilities for a typical central production facility filed with five satellite fields.

Facility/Disturbance	Number of Facilities/Miles	Total Amount of Impact
Development/Operational Facilities		
Central production facility-CPF (pads, road, airstrip)	1	100 acres
Satellite pad (10 acres each)	5	50 acres
Airstrip (100 feet x 5,000 feet; 10 acres each)	2	20 acres
Roads (7.5 acres per mile)[10]	55 miles	412 acres
Total acres – pads, roads, and airstrips		582 acres
Staging area (150 acres)	1	150 acres
Ice roads (10 miles per satellite pad)[11]	50 miles	250,000,000 gallons
Gravel Consumption		
Pads (10,000 cubic yards per ac)	200 acres	2.04 million cubic yards
Airstrip (74,000 cubic yards)	2	148,000 cubic yards
Staging area (10,000 cubic yards per acre)	1	150,000 cubic yards
Roads (60,000 cubic yards per mile)	55 miles	3.3 million cubic yards
Field Pipeline Rights-of-way		
Vertical support members (VSMs; 96 per mile)	55 miles	5,280 VSMs

Table 28. North Slope gravel consumption estimates

Effects of impacts on the Dalton Highway. Dalton Highway traffic is expected to increase prior to, during, and after construction of the gas pipeline. This will increase demand for maintenance, primarily gravel. The gravel source will probably be in the North Slope Borough. Increased traffic may increase the deflection of animals, especially caribou, from the road corridor. Increased traffic will also mean increased air pollution and dust, which will have an impact on the surrounding waterways and may influence the rate of snowmelt in spring. These factors will create issues that have not been studied enough to date to determine the impact. This is an area that should be covered in the EIS.

Impacts on village roads. Gas pipeline construction will require a significant number of miles of gravel access roads. For villages in the unorganized borough, such as Evansville, Northway and Tanacross, these new roads also may provide access to subsistence activity areas. Dust from road traffic will coat berries and plants in the vicinity, reducing the desirability of harvesting certain plant species adjacent to new gravel roads. Vegetation affected by dust may cause some animals to move away from areas they formerly occupied, thereby reducing access to traditional subsistence foods in some areas. Dust control funds are included in the construction impact funding in an effort to mitigate these potential impacts.

[10] Assumes 10 miles between each satellite pad and 5 miles between each CPF

[11] Assumes 10 miles of road are constructed for each satellite pad.

More activity in the Prudhoe Bay area will inevitably lead to more traffic and road activity on the North Slope. Barrow and Nuiqsut will each see increased traffic from induced effects of development. Further gas exploration and development brought on by the presence of a gas pipeline system will further impact road systems, and is covered in the cumulative impacts section of the report.

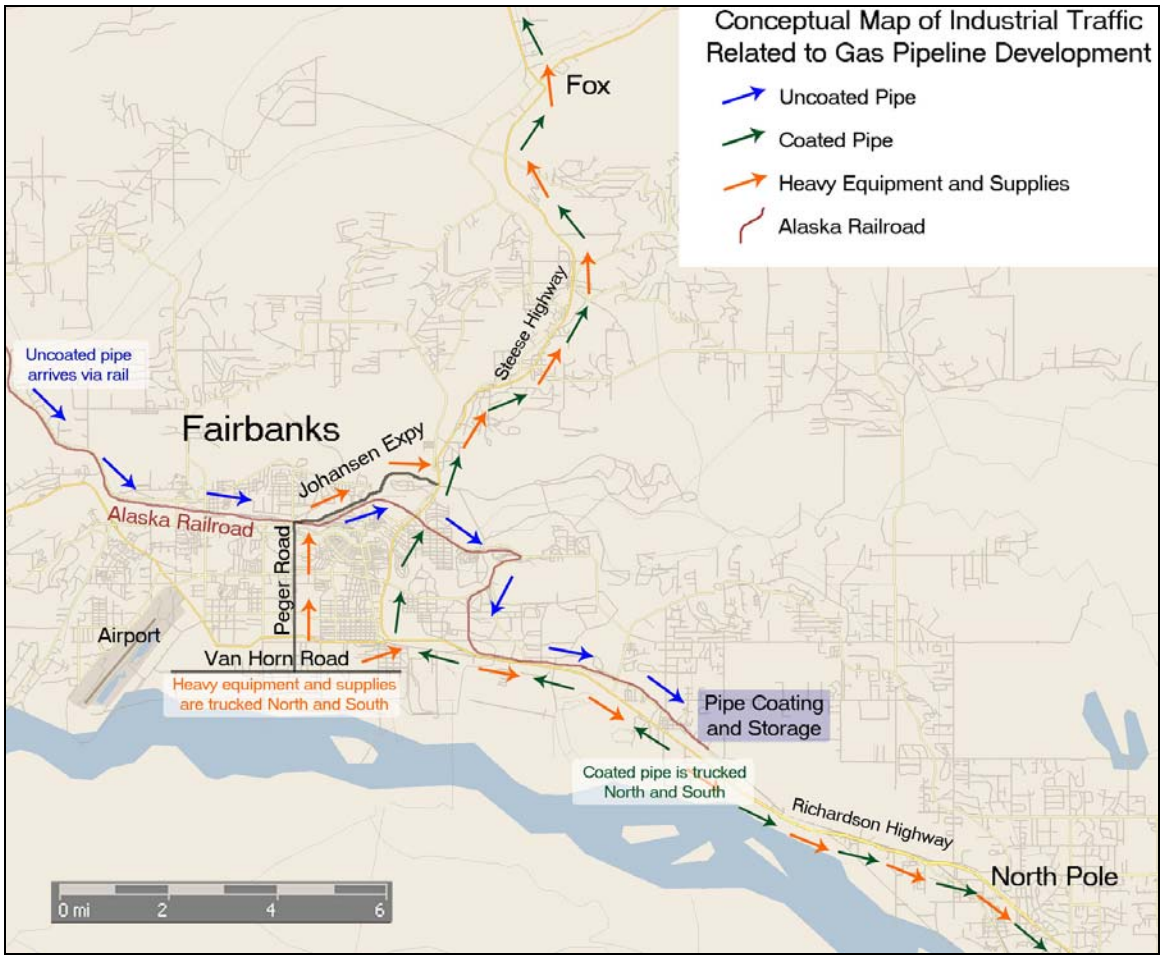


Figure 21: Conceptual map of industrial traffic, Fairbanks area

Potential impacts on the Port of Anchorage and Alaska Railroad. Neither the Port of Anchorage nor the Alaska Railroad has conducted detailed planning about the potential economic impacts on transportation conveyances if the gas pipeline is built. While they have no official gas pipeline planning processes in place, the agencies provided "informed speculation" about possible economic impacts.

Port of Anchorage. The route chosen for the gas pipeline will directly affect impacts on the port. If the route mirrors TAPS or ends at another terminus in South Central Alaska, the port expects to play a substantial role in handling materials and workers.

Port officials are pursuing a major expansion project estimated to cost $400 million. The expansion project does not add the capacity that would be required to handle additional

heavy traffic associated with building a gas pipeline. Under the most substantial gas pipeline impact scenarios, the port would need a special unloading berth, at a cost not yet calculated. The port also would need up to three mobile unloading cranes (present cost of $2 million each). An extended Alaska Railroad line to the port also could be required.

If a pipeline follows the northern route into Canada, the port still would likely see an increase in construction-related traffic. The amount of capital expansion is not known. Estimates per worker/per year average five to six tons of material support. The cost of providing services to an estimated 2,500 workers during construction has not been calculated.

The Alaska Railroad. The Alaska Railroad will see significant impacts from the gas pipeline project, as freight volumes increase dramatically. Alaska Railroad officials project the following impacts:

- Railroad track maintenance and equipment from gas pipeline-related shipping costs would increase. The Alaska Railroad estimates $35,000 to $40,000 per mile of track annually. If new track is needed the approximate cost of upgrades is estimated at $2 million per mile "under a best case scenario".
- The railroad would need to lease a yet unknown number of additional locomotives during the life of the project.
- Passenger trains, commercial rail traffic and activities in railroad yards would be affected. Impacts have not been quantified.
- Construction materials landed at Seward would require freight dock expansion and a new laydown area to accommodate unloaded materials, costing between $600,000 and $1 million.
- Materials landed at Whittier would require harbor improvements and another track. There is no cost estimate for these or any other additional specialized improvements.
- Under any scenario, the Alaska Railroad would need to build several laydown yards between Anchorage and Fairbanks. The number and cost have not been estimated.
- The railroad would need to add personnel trained in handling gas pipeline equipment, but the number of workers and their cost has not been calculated.

Figure 21 above shows a conceptual map of industrial traffic in the Fairbanks area, assuming rail transportation of pipe to a coating and storage yard somewhere between Fairbanks and North Pole. Absent Alaska Railroad routing changes, the volume of pipe and other freight movement through Fairbanks would cause significant traffic delays at the major railroad crossings – University Avenue, College Road, Steese Highway, and Richardson Highway. The planned railroad extension to Fort Greely, and potential Blair Lakes bypass, if completed prior to pipeline construction, would significantly reduce highway and road traffic impacts during gas pipeline construction.

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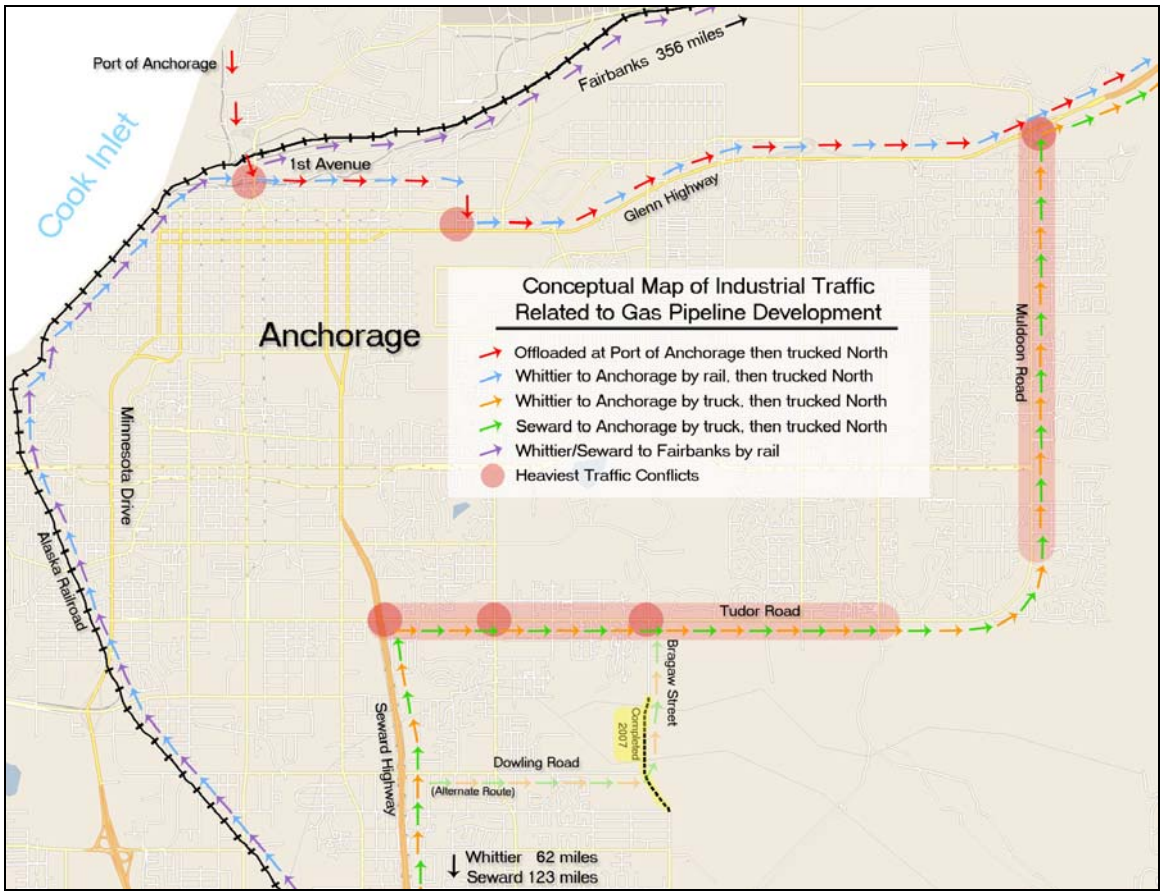
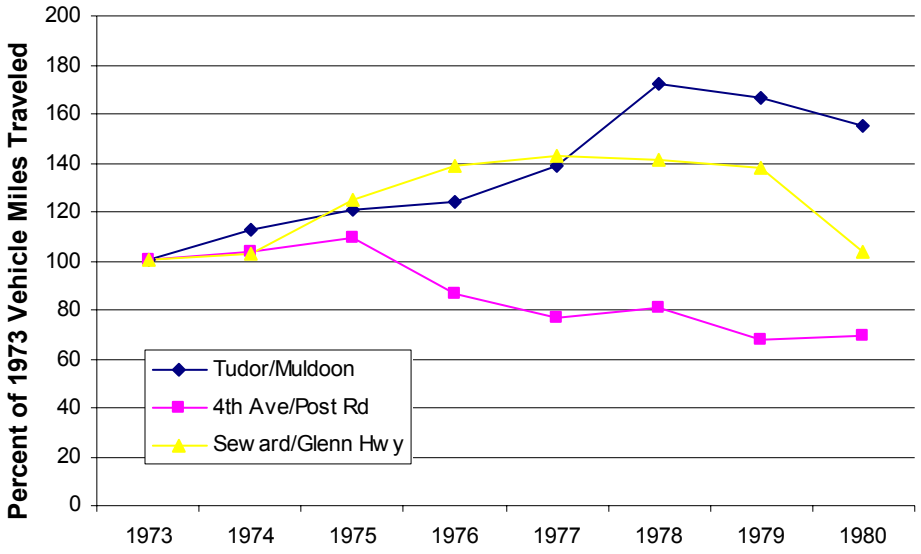


Figure 22: Conceptual map of industrial traffic, Anchorage

Potential impacts to local roads. During TAPS construction, road usage increased in affected communities, both on roads expected to have increased industrial traffic and on roads ancillary to direct truck routes. Historical data from the period show a clear increase in average daily vehicle miles traveled on roads in town and in suburban areas, as shown earlier. (See Figure 8.) Although the impacts were felt most acutely in pipeline corridor communities, road usage in support communities increased as well during TAPS. The following chart shows changing traffic patterns for several key intersections in the Anchorage area, expressed as a percentage of 1973 traffic volume. It should be noted that Anchorage area traffic increased more following pipeline construction than during it.



Source: Alaska Department of Transportation & Public Facilities Central Region Traffic Data

Figure 23: Road use at key intersections in Anchorage, 1973-80

In planning for a gas pipeline project, we anticipate a similar pattern of increases in road usage as seen during TAPS, though at a somewhat smaller scale, for both corridor communities (and for Haines/Skagway due to pipe trucking volumes) and for support communities.

Absent specific information about proposed truck traffic for hauling pipe and equipment and expected ancillary equipment, it is difficult to predict with certainty the increased traffic volume or the impact on roads due to increased traffic of heavy loads. In addition to increased commercial/economic activity, population increases projected to result from direct and indirect employment will raise average daily traffic in certain areas. The increase in traffic will vary by location and proximity to ports of entry and proximity to overall project activity.

Increased traffic for a project of a magnitude such as the gas pipeline will have less significant effects on many municipal roads. The Mat-Su and Denali Boroughs and Delta Junction will see increased traffic and related impacts along the Parks Highway. The Municipality of Anchorage will see increased truck traffic due to its port facility and as the nexus of major highways. A significant concern for the municipality will be the impact of additional traffic on already congested roads. All of the ten most congested sections of road in Alaska are in the Anchorage area (TRIP, 2002). At least four of these segments (highlighted in yellow in Table 29) can be expected to receive increased industrial use during gas pipeline construction, with accompanying impacts on public safety, increased pressure on emergency services, and increased congestion-related delays.

Rank	Route Name	From	To	Length (mi)	Daily Traffic	Volume to Capacity
1	Tudor Road	Arctic Blvd.	Campbell Airstrip Rd.	4.5	50,000	2.27
2	Northern Lights	Bragaw Street	Lake Otis Parkway	1.1	39,000	1.78
3	Muldoon Road	36th Avenue E	Dale Street	2.7	36,000	1.64
4	Lake Otis Pkwy	Tudor Road	68th Avenue	1.1	33,000	1.51
5	Debarr Road	Lake Otis Pkwy	Airport Heights Dr.	0.5	32,000	1.45
6	5th Avenue	Reeve Blvd.	6th Avenue	0.7	45,000	1.36
7	Benson Blvd.	C Street	Seward Hwy	0.6	30,000	1.36
8	Northern Lights	Seward Hwy	Forest Park Drive	2.0	30,000	1.36
9	5th Avenue	Mountain View Dr	Reeve Blvd.	0.3	43,000	1.27
10	Ingra Street	20th Avenue	15th Avenue	0.4	27,000	1.24

Source: The Road Information Program (TRIP), 2002. Highlighted roads are most affected by potential pipeline traffic.

Table 29: Top ten most congested highway segments in Alaska, 2000

Seward and Whittier will have a rise in economic activity at their ports, which will subsequently lead to road impacts. Tok (at the junction of the Alaska Highway and the Tok Cut-off route to Anchorage) and the City of North Pole on the Richardson Highway will experience impacts to their road infrastructure. These areas are slated to receive construction impact funding for roads. Ancillary road impacts are expected on the Kenai Peninsula, with the Kenai Peninsula Borough, the City of Kenai and Soldotna receiving assistance with road funding.

Effect of new demands on project funding. Historically, the state has received more project requests than it had funding in any given year. The 2004-2006 approved STIP follows that pattern. In addition, two recent, significant changes in transportation funding policy became effective in the 2004 STIP. The FHWA imposes a perpetual requirement for maintenance on projects funded under the federal-aid transportation program. Alaska DOT/PF, in turn, requires local governments and other entities receiving these funds to make the same commitment to long-term ownership. DOT/PF now requires local or other entities to have the legal authority to accept a commitment for perpetual maintenance if STIP funds are used for local (non-state owned) projects. Borough governments must have road powers on an areawide or non-areawide basis as required in Title 29.

There is also a new requirement for local match for projects. The 2004-2006 STIP provides definitions for the functional classification hierarchy:

- **Local roads** primarily provide direct access to adjacent land; they offer the lowest level of mobility and provide access to higher functionally classed roads.

- **Collector roads** offer an intermediate level of service between "local" roads and "arterial" roads; they provide land access, collect traffic from "local" roads, serve small communities directly, provide traffic circulation in larger communities, connect communities to the arterial network, provide service to important traffic generators and serve as intra-region travel corridors.
- **Arterial roads** emphasize a high level of mobility for through traffic: they serve major centers of activity of a metropolitan area; provide service for the highest traffic volume corridors; and link cities, larger towns and important traffic generators to form an integrated road network.

In FY04, state match funds were cut approximately 20 percent with the expectation that local projects would no longer be matched with 100 percent state funds. The new policy, according to the 2004-2006 STIP, requires that several classes of projects rely on 100 percent of the match funds provided by the local sponsor. For other STIP projects serving a joint state and local interest, the match is to be split between the state and local entities.

This new match policy shifts a traditional state cost to local entities. For example, on a state owned local road the state would pay 100 percent of the match providing it can secure an agreement that transfers ownership and maintenance of the road being upgraded to the local government. If the same state owned local road were being upgraded and the local government didn't agree to the transfer, the state would pay 50 percent of the match. For state owned minor collector roads the same match requirements apply. There are no match requirements for state owned major collector or arterials.

For non-state owned projects on local or minor collector roads, the new policy has the state paying 100 percent of the match only with a transfer agreement that transferred ownership and maintenance responsibilities. Without the agreement, the state would pay none of the match. With non-state owned major collector or minor arterials the state will pay 100 percent of the match with a transfer agreement and 50 percent of the match without an agreement.

While the STIP states that the policy is subject to change depending on the state's fiscal circumstances, the effect on Alaska municipalities will be to pass on a greater share of new project costs at a time when a statewide priority project is increasing the demand for those projects.

Road service area impacts. Some local governments in Alaska do not maintain transportation infrastructure on an area-wide basis, but allow service areas to form for local traffic. The primary example affected by this project is the Fairbanks North Star Borough, which as a second-class borough does not have road powers. The borough does not maintain any collector or arterial roads. There are a number of road service areas in the borough; they have been established within specified neighborhoods to provide for road maintenance and construction. All taxable real property within a service area boundary is subject to property tax at a rate recommended by the service area commissioners, approved by the Assembly and ratified by the voters. Approximately 95 percent of the FNSB's 127 service areas levy taxes to support their operations.

In the past, a portion of state shared revenue went to road service areas. With the earlier decline and current elimination of that funding source, the number of service areas that

tax themselves has steadily increased. Imposition of new or increased taxes can only be achieved through a local election authorizing an adjustment upward of an individual service area's tax revenue cap. A property tax levy in a service area is for functions limited to the service area. Other sources of funds for service areas include interest earnings and specific grants.

Road service areas will see increased traffic during gas pipeline construction – projected population increases will lead to increased vehicle miles traveled in these neighborhoods. If the increased traffic leads to a need for more funding, the local service area election process takes approximately a year. Service area roads impact assistance funding has been included for the construction years of the project.

Three existing road service areas contain small portions of TAPS property within their boundaries. If the gas pipeline route runs parallel to TAPS, those service areas likely will see some impacts. If taxes under AS 43.56 are not assessed, a portion of any payment in lieu of taxes would need to be assigned to the service areas.

Other communities do maintain roads. The City of Fairbanks, a home rule city, has road powers. It currently maintains nearly 115 road miles, with 238 lane miles. The majority of city maintained roads carry a functional classification as local roads with the remainder classified as arterials. Many of the city roads are already heavily worn, and the city's existing budget of less than $500,000 for patching and paving cannot address street replacement costing over $1 million per mile. In some cases the original construction was inadequate, leading to higher maintenance costs. Additional enhancements—such as proper storm drainage, relocation/upgrading of existing utilities, installation of standard sidewalks with access curbing, and compliance with ADA issues—further increase costs to the community.

The Fairbanks North Star Borough and the City of Fairbanks will experience among the greatest infrastructure impacts during construction of the gas pipeline. If TAPS experience is any indicator, roads within Fairbanks city boundaries will see significant impacts as well. Although there exist needs that cannot be attributed to a gas pipeline project, it is difficult to gauge the true cost of impacts because of the deteriorated state of the infrastructure. According to the City of Fairbanks Public Works Department, overlays are the only effective method of extending the life span of city streets. Streets repaired by this method should remain intact for an additional ten years or more without requiring constant repair. Cost estimates for road overlays are approximately $300,000 per mile.

Projects on both state owned and non-state owned roads with a functional classification of local, collector or minor arterial are likely to require a some form of local match and perhaps the promise of local road maintenance in perpetuity. Circumstances external to the gas pipeline project are likely to compound current road problems in the City of Fairbanks. City roads in Fairbanks are likely to receive the construction project's highest impacts of all non-state owned roads. Fairbanks will receive impact funds during construction for road improvements and maintenance.

The City of Fairbanks also has a revenue cap, similar to those of the Fairbanks North Star Borough and the Municipality of Anchorage with revenue cap set at previous year's revenue plus CPI, new construction, bonding, voter approved services, and special appropriations on an emergency basis. It is not expected that any oil and gas property will

be located in the City of Fairbanks, nor that the city will receive a payment in lieu of AS 43.56 property taxes after construction.

Haines and Skagway transportation impacts. As referenced in *Arctic Gas Pipeline Construction Impacts on Northern Transportation* done by PROLOG Canada, Inc. and the Van Horne Institute in January of 2003, the ports of both Haines and Skagway are areas of significant transportation impact particularly regarding the Canadian portion of the proposed natural gas pipeline. With assumption that the 52" pipe can only come from Germany or Japan, the use of these Inside Passage ports will minimize the inland transportation routes within Canada. The following impacts highlighted in their report have been summarized as follows (note: tonnage is expressed as metric tons. One metric ton is equivalent to 2,204 pounds.):

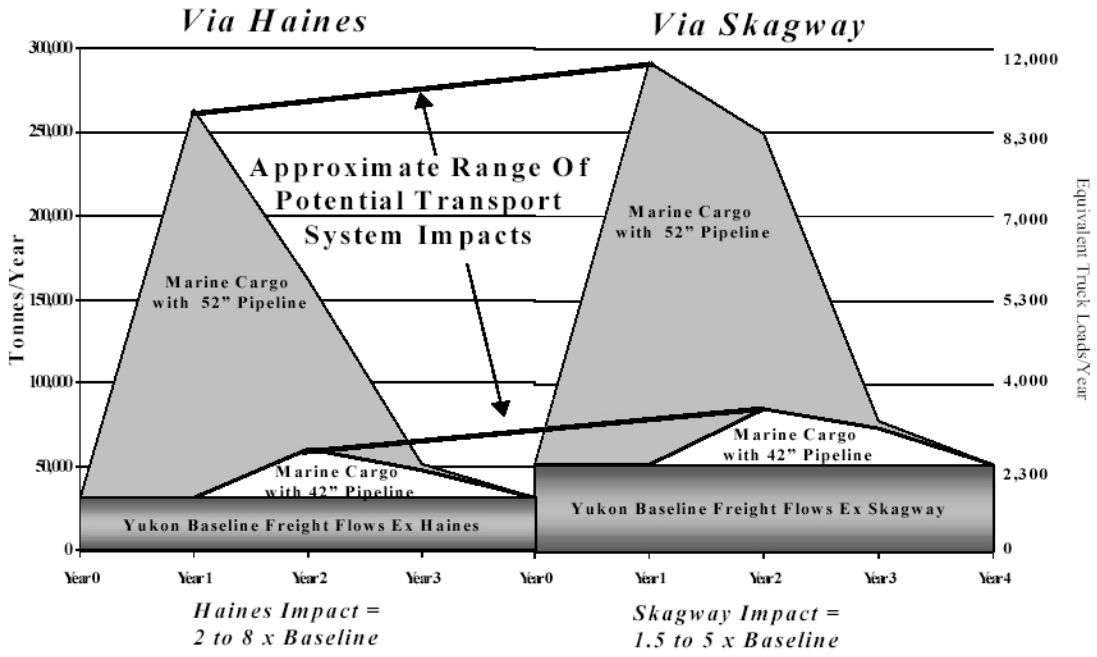


Figure 24: Transportation impact on Haines and Skagway[12]

Impact on Haines

- Port capacity, in terms of freight flow, is not a primary constraint
- Haines cargo operations take place at Lutak City dock with a 600 foot dock face
- Two-thirds of dock facilitates commercial cargo operations
- One-third dedicated to Alaska Marine Highway ferry operations
- 2002 Port Improvement Project reconstructed the dock face, cargo apron, and water depth

[12] Figure 25 is reproduced from "Arctic Gas Pipeline Construction Impacts on Northern Transportation", PROLOG Canada, Inc. and the Van Horne Institute, January 2003.

- Due to existing levels of marine/cargo operations and due to the recent port improvements, Haines is considered to have sufficient capacity to meet the logistical requirements addressing the Yukon portion of the pipeline.

Impact on Skagway

- Relative impact of project logistics is less than at Haines, even though port capacity is greater
- During 2002, over 400 cruise ships carrying over 600,000 passengers arrived in Skagway
- Minimal marine cargo operations occur here – comparable to Haines.
- The Alaska Industrial Development and Export Authority (AIDEA) Ore Terminal has been dismantled. Skagway's Ore Dock, owned by the Skagway Terminal Company, can potentially provide increased open-storage capacity
- The new Alaska Marine Lines dock face can support a roll-on/roll-off ramp
- The northern berth of the White Pass railroad is reinforced for heavy cargo
- Port is almost vacant from October through April.
- Because of the potential logistical conflicts due to the summer cruise ships; Skagway's transportation impact could be significant for the Yukon segment of the pipeline.

Easement of impact on Haines and Skagway

- Primary cargo hauls should occur during the winter/off-season months
- Potential diversion of all or some of Skagway summer cargo to Haines

Freight, including sections of pipe, will need to move through Haines and/or Skagway for the Canadian portion of the gas pipeline system. The Sponsor Group has not identified the proportion of pipe and other freight that will move through Haines and Skagway, so current estimates of impacts must be attributed to the two together. Whether that freight movement will be by American or Canadian equipment, contractors and workers is equally uncertain.

LAW ENFORCEMENT

During the TAPS era, surges in population, traffic and disposable earnings led to significant increases in crime in municipalities located in proximity to the oil pipeline route. Anchorage experienced impacts to a lesser extent. While the impacts expected with the gas pipeline project are likely to be far less dramatic, there will be community impacts to law enforcement:

- Increased traffic will lead to increased vehicle accidents and motor vehicle infractions
- Increased population will affect overall levels of criminal activity
- Increased population will affect access to, and competition for, subsistence resources

The State of Alaska Department of Public Safety (DPS) provides law enforcement in the unorganized areas of the state and in areas of municipalities without police powers. The Alaska State Troopers (AST) are charged with law enforcement of all criminal and traffic law of the State of Alaska. The troopers define their main tasks as identification and apprehension of violators, and the prevention of crimes and traffic violations. These tasks are emphasized in areas not covered by a local police unit. The department also manages the Village Public Safety Officer (VPSO) program, serves warrants, transports prisoners and executes search and rescue missions.

The VPSO program began in the 1970s to provide communities in rural Alaska with public safety services at the local level. Law enforcement in rural areas is the responsibility of DPS. A lack of road connections to many rural communities, poor weather conditions and large response distances hamper troopers' ability to respond in the time events warrant. The VPSO program employs individuals residing in villages as first responders to public safety emergencies. Duties include search and rescue, fire protection, emergency medical assistance, crime prevention and basic law enforcement. VPSOs don't carry firearms but are armed with other non-lethal weapons.

DPS contracts with regional Native nonprofits to administer the program and VPSOs are employees of the corporations. Given the vast expanse of Alaska and the varied population densities, providing service is difficult. In addition, there have been chronic complaints of program under-funding and pay scales too low to retain officers. There are no VPSOs currently serving the proposed gas pipeline corridor villages. Increases in population, industrial traffic and induced activity mean the smallest communities will have no local law enforcement. The increased population and traffic pressure will require increased law enforcement presence; the most cost effective way to provide this presence at the village levels is to fund VPSOs in each road-access community along the gas pipeline route.

DPS has not been exempt from declining state operating budgets in recent years. Although the national average is 2.5 officers per 1,000 population, Alaska State Troopers have less than half that average. Additional state troopers are not a direct municipal impact, but call volumes for Alaska State Troopers are likely to increase just as those in other local law enforcement agencies, impacting a significant amount of the statewide population.

Additional state trooper and local police funding is included in the construction impact figures. Trooper staffing is already under optimal levels in many areas of the project – in particular the North Slope Borough has had next to zero trooper coverage for its 30-year history.

Given the long lead time for recruitment and training, funding will be required for the pre-construction year and through the entire construction period of the Alaska gas pipeline project. Based on anticipated traffic volumes, new state trooper and municipal police presence will be required in the following communities and areas of the state:

- Delta Junction / unorganized region
- Fairbanks North Star Borough and Cities of Fairbanks and North Pole
- North Slope Borough

- Mat-Su Borough
- Denali Borough
- Municipality of Anchorage
- Kenai Peninsula Borough and Cities of Kenai and Seward
- Haines Borough / City of Skagway

	CSO (Court Service Officer)	Commissioned Trooper	Seasonal (Out of Fbks)	City Police	Borough Police
Anchorage Municipality				299	
Coldfoot	0	1			
Delta Junction	0	5	1		
Fairbanks City	0	0	1	43	
Fairbanks North Star Borough	6	51			
Haines		1			
Homer				12	
Kenai				16	
North Pole City	0	0		10	
North Slope Borough	1	0			10
Northway	0	3			
Palmer		30		12	
Seward				10	
Skagway				5	
Soldotna				13	
Tok	0	4			
Valdez				11	
Wasilla				20	

Table 30: Law enforcement coverage, 2003-04

EMERGENCY SERVICES

The greatest influx of personnel and activity under the Sponsor Group application is expected to be in Interior Alaska, in Fairbanks and in the pipeline corridor communities. While the Sponsor Group plans in-house medical support at pipeline construction camps, and medical evacuation contracts for emergencies, the increased activity throughout the pipeline corridor will increase the need for first responders and medical transport. Maintaining the ability to effectively respond to emergency situations, whether they are fire or ambulance calls, is critical to a safe project and community environment.

This study anticipates cost impacts to village clinics and to both volunteer and paid emergency service departments for both medical and fire emergencies.

The best historical data available is from the City of Fairbanks, which provides fire and ambulance service within city boundaries. During TAPS construction, both fire and ambulance calls more than doubled over a three-year period, and closely mirrored the growth in population. (Fire and ambulance run statistics dating from pre-pipeline days are not available for any other service providers due to time elapsed and changed document retention methods over the last thirty years.)

The gas pipeline project is expected to be smaller in terms of workforce and overall activity than TAPS construction. The infrastructure in Alaska is more developed and, thus, more capable of handling an influx of personnel and equipment. In addition, there is a changed corporate culture that emphasizes health and safety issues.

There will, however, be an increase in population, general traffic, and large truck traffic along the major transportation routes cited above. A mixture of paid and volunteer responders provide emergency medical and fire services in Alaska. Higher population density areas tend to support paid departments, while more remote, less densely populated areas tend to rely on volunteer or combination (paid and volunteer) departments. Agencies provide fire suppression and a range of emergency medical services, advanced life support, basic life support and basic life support with occasional advanced life support.

City of Fairbanks. The City of Fairbanks Fire Department provides fire suppression, paramedic level pre-hospital emergency medical care with transport, hazardous condition mitigation and rescue services. It also provides fire code management and has a public education component. The City Fire Department is an all-paid department. During the oil pipeline construction, both paid and volunteer departments lost a significant number of personnel to higher paying jobs, and then had to replace them at higher wages. That is not anticipated to be the case with construction of the gas pipeline, but there may be a need for increased staffing during construction. Attrition in senior department personnel will even out the staffing pattern post-construction. Expenditure of capital funds for the department during construction will simply keep pace with an existing phase -out of aging equipment rather add “extra’ equipment that would be superfluous after construction.

Fairbanks North Star Borough. The Fairbanks North Star Borough, as a second-class borough, has non-areawide emergency service powers. Voter-approved service areas provide services within geographic areas that provide fire protection and ambulance/rescue services. Currently there are five fire service areas that protect approximately 88 percent of the residents not serviced by the City of Fairbanks and the City of North Pole. All borough fire departments, including two municipal, two state, three federal, and five service area departments, agree to work together under the Mutual Aid Agreements. Of the five fire service areas, three – the Steese Area Volunteer Fire Department, North Star Volunteer Fire Department and Salcha Rescue, which provides ambulance service only – are expected to be impacted by increased population and increased traffic as a result of their geographic location and areas served. The assumption of impacts on these particular organizations is predicated on the anticipated increased traffic induced upon population and commercial activity, that will accompany a highway route gas line.

These volunteer fire departments will experience an increase in calls during gas pipeline construction. What is unknown is if these increases will result in a decreased volunteer pool as a result of increased economic activity. The cost of a volunteer is largely an investment of time and training and equipment dollars. Entry-level firefighter training is a minimum of 160 hours, with ongoing weekly training requirements as well. Emergency medical technician training requires a considerably higher cost and time commitment. Since adequate fire and ambulance service is critical to any community, a portion of the construction impact operating funds will go to the volunteer fire departments. A portion of the pipeline will be constructed within the boundaries of the volunteer departments, so a portion of any construction PILT payments should be allocated toward the departments.

Salcha. Salcha Rescue provides ambulance service for approximately 1,000 people, although the area covered is vast. It reaches from milepost 340 to milepost 157 along the Richardson Highway; along the Salcha River and the pipeline corridor, and along the Tanana River. Salcha Rescue has one paid person and 16 volunteers. The Richardson Highway will experience a significant increase in traffic during construction of the project, so it can be anticipated that Salcha Rescue will be impacted by increased calls. What is difficult, without even discussing funding levels, is determining how to assist this small department that provides ambulance service for 183 miles of the Richardson Highway.

The projected costs of emergency services impacts include operating funding for each of the volunteer fire and ambulance departments throughout the pipeline corridor.

City of North Pole. The City of North Pole provides ambulance and fire service within its boundaries. In addition, the City has a contractual arrangement with the Fairbanks North Star Borough to provide ALS services with transport to North Star Volunteer calls. This area of service covers approximately 100 square miles.

North Slope Borough. Although specific impacts are difficult to estimate, it is important to note how emergency medical services are provided in the North Slope Borough, which covers a vast 90,000 square miles. Ambulance service includes ground ambulance in Barrow and the seven villages, as well as medical evacuation (medevac) from outlying villages to Barrow, and from Barrow to care centers in Anchorage. The services are provided by Search and Rescue (aircraft and pilots) and by the Fire Department (medical services). Search and Rescue also provides critical support to subsistence whaling crews. The Search and Rescue Department operates as a Part 91 carrier, which allows it greater flexibility in terms of responding to medical emergencies in adverse weather conditions, but restricts its ability to get reimbursed for those services.

A review of 2002-03 medical transports indicates 253 flights, primarily from the villages to Barrow and then to Anchorage, although the department has been known to respond to emergencies outside its specific mission when both the need arises and the use of its equipment is relevant to the situation. While industry may be prepared for medical emergencies, as the only medivac service “on station” on the North Slope with two aircraft, the borough may find itself delivering services within its boundaries, due to its location and availability of service.

City of Delta Junction. The Delta Rescue Squad and the City of Delta Volunteer Fire Department provide fire and ambulance services in the Delta Junction area. These are volunteer organizations. The City of Delta supports the volunteer departments financially, with funding for repairs and maintenance, insurance, training, utilities and supplies. In addition the Rural Deltana Volunteer Fire Department, located in Delta Junction, provides area fire service. The department provides service to approximately 2500 residents over a 500 square area. Tok is also served by an all-volunteer department and has responsibility for fire/EMS services in the area.

Haines Borough. Expected to increase are ambulance and fire calls in the Haines Borough, as a result of increased port/truck traffic. The Haines department responds to fire and ambulance calls, and provides the search and rescue function within the Haines borough and along 75 miles of the Haines Highway. The department is a combination department with two paid staff and 42 volunteers. The volunteer base is relatively stable, although there are some conflicts between volunteer and paid employment responsibilities that may be exacerbated with increased call volume. Should the department experience volunteer turnover, the department will incur increased operating costs for training, gear and equipment for new volunteers.

Within the Haines Borough, fire service is provided by service area and funded by service area specific mill rates with some grant funds. The fire department sets its annual budget and the mill rate, which is then established, based the annual need. Included in the annual budget is $40,000 year for vehicle replacement. The department has a 2001 pumper truck with a 1976 pumper truck for backup. Tankers being utilized by the department were built in the late 1960's; the need for equipment replacement will outpace the growth of the vehicle replacement fund if contributions continue at the current rate. Haines fire call volumes are relatively low and mirror its population.

Ambulance service in the Haines Borough is funded with a dedicated half- cent sales tax. There is no charge for ambulance calls, except through the sales tax. Area covered is 75 road miles, although the vast majority of calls are within five miles of town (also where the population is centered). The sales tax pays for part of the cost of dispatch. In addition, $5,000.00 per year is put into a vehicle replacement fund. Approximate cost of a new ambulance is $150,000. As of 2004, the Haines ambulance vehicle replacement fund had a $45,000 balance. The department runs two ambulances, a 1993 that is used for primary response a 1972 that is the backup. Haines received a grant of $120,000, which coupled with the $45,000 in the replacement fund will purchase a new ambulance. In 2005, they will have a 2005 ambulance and a 1993 backup. The vehicle replacement fund will be depleted. At the current rate of contribution, it will take 30 years to accumulate the cost of a new ambulance in 2004 dollars. If increased call volumes materialize as anticipated, assistance with vehicle replacement will be required.

City of Skagway. The City of Skagway provides police and fire protection, emergency medical services, and has a local medical clinic. Search and rescue services are provided by the State Troopers, with some assistance from the Skagway Volunteer Fire Department.

To the extent the Skagway dock is used for pipe shipment, the city can be expected to see an increase in emergency medical and fire calls. The Skagway Volunteer Fire

Department is the emergency responder, responding to 253 incidents last year. The department is staffed with one full-time fire chief, one full-time support technician / building inspector, and three part-time personnel, including a support technician, an administrative assistant, and a seasonal EMS responder. The department has ten to 20 volunteers in the winter and up to 36 in the summer, and may need additional support during peak shipping times.

The Skagway Police Department operates with seven full-time and four seasonal employees. The Skagway Medical Clinic is city owned and operated, with two midlevel providers offering emergency room care, urgent care, and other clinic support.

Seward and Whittier. Seward and Whittier are expected to experience increased call volumes as a result of increased freight activity and slight increase in population during the construction of the gas pipeline.

HEALTH AND HUMAN SERVICES IMPACTS

Alaska does not expect a large migration of potential workers from other states seeking employment on the gas pipeline. TAPS brought many drifters into the state because word went out that unskilled or low-skill jobs were available for all comers. For the Alaska gas pipeline, recruitment will target workers with the specific, technical skills needed in this highly specialized field.

Gas pipeline construction workers, for the most part, will live in pipeline camps, minimizing impact on village and municipal services. Seasonal workers from outside Alaska are not expected to bring families in significant numbers, and the families of those workers already in Alaska are unlikely to relocate.

Employers and society have drastically reduced the tolerance for alcohol and other substance use seen at work sites during construction of TAPS. In most industrial settings, and certainly during gas pipeline construction, any use of alcohol or recreational drugs will cause job termination. Because of this policy and a better service delivery network developed over the last 30 years, substance abuse issues and domestic violence are not anticipated to spike during this pipeline construction.

Some community social services, such as childcare, Women Infants and Children (WIC) and emergency food and shelter, are expected to have minor increases during the three years of construction. There may be a need for shelter and food after workers end a season of work. The greatest area of expected increase in service demand is for medical care and emergency response needs. Although the pipeline construction camps will have resident medical providers, the communities in the pipeline and transportation corridors will bear the brunt of increased traffic accidents and ancillary medical events. Indirect and induced economic activity will bring its own demands for increased medical care.

The larger communities have services for mental illness and substance abuse treatment. Smaller communities and villages have small clinics and health aides with both informal and formal referral systems in place. This report assumes current-funding levels will remain constant. However, the very real threat of continued funding losses from local, state, federal and other sources for nonprofit service providers' means potential loss of

community services. The State is in a period of consolidation and regionalization of behavioral health (mental illness and substance abuse) services. Funding for substance abuse has declined sharply since fiscal year 2003. If cuts continue, agencies may not be able to absorb even a small increase in demand triggered by the pipeline.

In villages, the most significant health and human service cost will be for hiring additional health aides. Within the municipalities that have human service powers, additional funding can be dispersed according to the mechanisms currently in use.

EDUCATION IMPACTS

The infrastructure of Alaska's municipal school districts has increased with the state's population. The largest districts, in the areas most likely to receive families of pipeline construction workers, would have the least trouble absorbing new students.

Contrasting the TAPS experience, large numbers of families are unlikely to migrate to Alaska with pipeline workers because of the remoteness of camps and the seasonality of construction. Lack of services in villages along the pipeline route also makes it highly unlikely that newcomers to the state would settle in isolated communities, such as Dot Lake or Northway.

Of those families that move to the state during construction, a few might choose to locate in Tok or Delta, but the greater number will find their way to the major population and service centers. Several hundred new students can readily be accommodated in school facilities in Anchorage and Fairbanks, and minor additions will not cause overcrowding in the smaller municipalities.

School District	94-95	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03	03-04
Alaska Gateway Schools	533	552	582	523	517	480	490	500	497	502
Anchorage Schools	47,655	47,318	48,109	48,888	49,587	49,382	49,526	49,767	50,055	49,722
Delta/Greely Schools	994	922	879	813	1,443	1,107	850	1,018	1,108	1,182
Fairbanks North Star Borough	16,208	15,968	16,339	16,430	16,226	15,999	15,659	15,385	15,412	14,810
Haines Borough Schools	414	439	442	442	440	425	402	379	331	328
Kenai Peninsula Borough	10,142	10,314	10,415	10,459	10,300	10,225	9,925	9,971	9,750	9,645
Mat-Su Borough Schools	12,077	12,338	12,479	12,768	12,942	12,735	13,008	13,410	13,870	14,372
North Slope Borough	2,075	2,133	2,225	2,272	2,101	2,131	2,187	2,165	2,115	2,065
Skagway City Schools	128	134	141	126	128	133	132	125	117	110
Tok School*	-	286	295	263	256	227	256	265	260	254
Valdez City Schools	925	903	888	890	852	868	863	883	870	874
Yukon Flats Schools	474	475	527	496	407	382	349	321	321	313
Yukon/Koyukuk Schools**	726	802	793	740	671	556	495	498	933	1,477

Enrollment recorded October 1. *Tok School is part of the Alaska Gateway School District. **Added Raven Correspondance School in 2002. Source: Alaska Department of Education and Early Development.

Table 31: Pre-K to 12th Grade enrollment, 1994-2003

A significant impact will come with demand for instructional and support staff when in-migration causes school populations to expand. To the extent the need for teaching positions can be anticipated, recruitment efforts can focus on in-state preparation of new teachers.

POPULATION-BASED GOVERNMENT IMPACTS

For purposes of this report, these government impacts are defined as impacts to either organized or unorganized communities that fall outside specific categories of impact, such as roads, education, law enforcement, fire and emergency services. General government impacts cover a wide range of services.

As noted earlier, municipal structure, powers and services vary greatly. In order to gauge general government impacts, revenues and expenditures for each affected municipality are examined. Deleted from consideration are those items considered separately:

- Contribution to education, as it is considered in a specific impact category,
- Debt service, as it is not generally an immediate function of population or economic activity,
- Expenditures for pass-through programs, such as child care assistance,
- Fire, emergency services or law enforcement as those impacts are examined in a separate category and
- Capital projects expenditures.

Individual community profiles listing both powers and services provided by each community are included in Appendix B of this report.

Modeling indicates that during the construction of the natural gas pipeline project, population in the state will increase as a result of direct, indirect and induced employment, with attendant increases in service costs. In order to determine general government impacts, these population-induced services were examined and modeled.

General government impacts will vary by community depending on their proximity to actual construction and shipping and transportation corridors. Economically impacted communities will see increases in demands for services falling under the general government category.

Planning, zoning, and permitting. . Municipal planning and zoning departments are typically responsible for land use regulation and enforcement, zoning and building permitting, and platting. Many now use geographic information systems (GIS) to assist with mapping. Permitting functions include everything from floodplain and coastal zone management issues to the more mundane driveway and building permits. Increases in overall economic activity and population will likely result in increased demand for most of these services.

Many communities will also incur planning and zoning costs directly related to pipeline development. If the lessons of TAPS are heeded, planning for pipeline-related growth and impacts will begin well in advance of construction. Community planning needs to be

based on specific, actionable, up-to-date information from industry regarding workforce numbers, project schedules, and anticipated needs for local services.

The confidentiality agreement with the Sponsor Group prevents disclosure of information that would be relevant to planners at the municipal level. Industry can help municipalities prevent disruptions in service and minimize or avoid unwanted social impacts by providing accurate and concrete information on development plans as early as possible in the planning process. The North Slope Borough, in particular, feels that it cannot participate in another TAPS-like project without a fuller, more complete knowledge of what is planned. Additional costs may be born by municipalities who decide to monitor and assess actual impacts, or by the state if it wishes to monitor impacts in the unorganized borough.

Planning and zoning impacts on the North Slope Borough. The North Slope Borough in particular will be heavily impacted by pipeline-related planning, zoning and permitting costs, given that a significant portion of the gas pipeline and the entire gas treatment plant will be located within borough boundaries. The borough's permit review process provides a critical function that identifies and requires conditions of development to protect the cultural and subsistence resources of the borough, while allowing reasonable development to proceed. A review of land use control and zoning activities in the NSB Planning Department over the last four years indicates the borough annually processes approximately 183 administrative approvals and minor permit alterations, two conditional use permits, 61 development and coastal management program consistency determinations and two rezones. This workload is likely to increase once the permitting process begins for the natural gas pipeline.

The borough anticipates additional costs for assessing impacts. Presently the borough has dozens of studies in progress. NSB staff, in its Wildlife Management department, the Mayor's Office, the Department of Public Works and Planning, review all regulatory documents in order to assess impacts on North Slope residents and provide comments. This effort will intensify as development continues. The borough has yet to determine how it will cover the cost of both evaluating the studies once they are completed and to implementing the recommendations. NPR-A grants will only go so far in addressing these issues.

Parks, recreation, libraries. Depending on the powers and structure of the government entity, these functions of government are generally population driven. Parks, walking, biking and ski trails, ball fields, soccer fields, ski warm up huts, libraries all fall into the category of recreational facilities. The need for maintenance, upkeep, and staff increases as the number of users grows. Depending on the demand for services, the need for new or upgraded facilities may occur.

Assessing. Municipal assessing offices are generally responsible for administering fair and equitable property assessments by inventorying all taxable property and accurately estimating the market value. The assessing office usually responds to inquiries regarding methods and values, laws and regulations, and provides information about assessment and related property matters. Oil and Gas property assessment, however, is primarily the State's responsibility. Assessment work for the North Slope Borough is currently contracted to a private vendor.

Tax Audit. Municipal governments audit taxpayers to determine whether appropriate levels of taxes are being paid. The North Slope Borough performs oil and gas property tax audit functions under a memorandum of understanding with the state on behalf of the other municipalities with oil and gas property.

Land management. These departments in local governments are generally responsible for the management, transfer and acquisition, or sale of real property owned by municipalities. Depending on the quality and type of land owned by the municipality, land management departments may also be responsible for managing resources on the land, such as timber or gravel, and making improvements on property for sale. Population increases are a minor factor in these activities, although economic activity will increase service requirements for some municipalities.

Solid waste disposal and collection. The U.S. Environmental Protection Agency developed requirements for solid waste disposal that make landfills an expensive and tightly regulated service. Population increases lead to more solid waste, regardless of location. Some impacted municipalities have discovered that their solid waste collection and disposal numbers are increasing at rates higher than population expansion. This discovery may be attributed to Alaska's geographic location and the impacts of man-made goods shipped from other locations, which are consumed in the state. Both population and increased economic activity will lead to increased costs for solid waste collection and disposal The existing Oxbow Landfill in the North Slope Borough's Service Area 10, used by industrial operators in Prudhoe Bay, has an estimated five-year remaining life. Solid waste utility operational issues, including costs for construction of a new landfill and closure of the existing landfill, will need to be addressed prior to gas pipeline construction. These costs are not addressed in this report, as they are subject to rate-setting and full cost recovery from industrial users under established procedures of the Regulatory Commission of Alaska.

Public works. These services relate to facilities other than roads, which are calculated in a separate formula. Facilities such as community activity centers, performing arts centers, impound lots, health centers, are usually maintained by public works departments. Municipalities generally apply a dollar amount to define maintenance projects, as opposed to capital projects. Public works departments also supply engineering and construction management services for many types of facilities. Increased population leads to increased use of facilities and thus the need for increased funding in this category.

Miscellaneous services. Some municipalities that regulate the importation of alcohol into their communities may see this function impacted by increased population or increased economic activity. Animal control is a common municipal service, which might experience slight increases due to population growth.

Wage inflation. Using IMPLAN economic modeling software, the effects of wage inflation were calculated. Wage inflation will have a direct impact on municipalities and is included in construction impacts funding. Local government is typically not thought of as overly competitive in terms of wages. During TAPS, municipalities lost personnel of all classes, and municipal wages had to be increased in order to attract workers. The gas pipeline project is expected to have a far smaller impact on wages.

Subsistence research and monitoring. The nature and extent of subsistence impacts, and plans for mitigating them, should be addressed through the National Environmental Protection Act process. In areas such as the North Slope Borough, the Upper Tanana region and the Yukon Flats, however, subsistence research and monitoring funds can help local governments assess the cumulative, long-term impacts of development on subsistence and ultimately help these areas plan for future development projects. A combination of science and local traditional knowledge will enhance many processes. Subsistence research and monitoring funds can also assist in updating the existing body of subsistence harvest data.

Village liaisons. Villages will be impacted directly by increased construction activity and indirectly through increased access to the villages and subsistence resources. In order to help mitigate these impacts, the impact model provides funding during construction of the project for village/community liaisons to enable these communities to monitor and assess construction activities. The liaison position can act as a communication conduit both to and from the villages on aspects of concern to residents and function as a point of contact for regulators, governmental agencies, and project owners. Developing formal communication process and providing the resources for the formal process should help facilitate various aspects of construction.

VII. Revenue Impacts of SGDA Alternatives

The Stranded Gas Development Act allows contract terms for payment in lieu of one or more taxes. If the commissioner approves a SGDA application and proposed project plan, the commissioner may develop proposed terms for inclusion in a contract for periodic payment in lieu of one or more taxes that otherwise would by imposed by the state or a municipality on the qualified sponsor. Essentially all taxing authority a municipality may have had on a natural gas pipeline project may be removed in favor of a state negotiated PILT for any municipal taxes.

TAXES CONSIDERED FOR SGDA CONTRACT

AS 43.82.210 lists the following specific taxes as eligible for SGDA contract negotiations:

- Oil and gas production taxes and oil surcharges under AS 43.55
- Oil and gas exploration, production, and pipeline transportation property taxes under AS 43.56
- Alaska net income tax under AS 43.20
- Municipal sales and use tax under AS 29.45.650-29.45.710
- Municipal property tax under AS 29.45.010-29.45.250 or 29.45.550 – 29.45.600
- Municipal special assessments under AS 29.46
- Comparable taxes or levies imposed by the state or a municipality after June 18,1998
- Other state or municipal taxes or categories of taxes identified by the commissioner.

State taxes. The oil and gas production taxes and oil surcharges under AS 43.55, and the Alaska net income tax under AS 43.20, are levied only by the State of Alaska, not municipalities, and are not discussed in this study. These state taxes are of significant size, and affect the profitability and risk of the gas pipeline system in a similar fashion to the municipal taxes. The state will have to consider the effects of its tax structure as it determines the appropriate level of municipal tax changes in negotiations with the Sponsor Group.

Local sales and use taxes. Current municipal sales taxes generally have low maximum limits that would apply to any purchases made during gas pipeline construction.

The Sponsor Group application and supporting confidential data have virtually no information about the location of purchasing activities, making analysis of the costs of "what if" sales and use taxes problematic. If the SGDA contract negotiations consider a blanket exemption from sales and use taxes, further analysis will be necessary to determine the construction PILT required to administer the exemption, and to determine the extent of municipal revenue impacts.

Alaska law prohibits sales taxes targeting a single industry, so any new imposition of sales taxes in a municipality without current sales taxes would also impose sales taxes on the municipal residents, which acts as a brake on such taxes. Alaska's largest municipalities have revenue caps that would result in corresponding decreases in property taxes for any sales taxes imposed, yielding no net revenue benefit to a municipality imposing such a tax.

Vendors collect sales and use taxes from purchasers, and then report tax collections to the taxing jurisdiction. An exemption to sales and use taxes for a gas pipeline project would require that each vendor in the community understand (a) the buyers who are eligible to receive the exemption and (b) the goods and services that are eligible for the exemption. Generally such exemptions are managed by tax-exempt documentation to be carried by all purchasers and recorded by the vendor, requiring the addition of municipal staff to issue the documentation. This also would require purchasing staff (of the sponsor group, and those of its contractors and vendors, if any, who themselves would be conducting tax-exempt purchases) to apply for and track such documentation. The taxing jurisdiction would need to add staff to audit the sales tax records to ensure that only valid exempted sales are excluded, and that purchasers of goods and services that are not destined for gas pipeline uses do not falsely claim exemption.

Further work might be necessary on the part of purchasers to document the transaction location for exempt transactions. In addition, each municipality has its own list of exempted goods and materials. Significant effort would be required to standardize and expand the existing exemptions for gas pipeline materials, goods and services.

Based on the challenges in administering an exemption to local sales and use taxes, and the low level of existing taxation, the Municipal Advisory Group recommends against inclusion of sales and use taxes in an SGDA contract. The group is, however, willing to accept language in a SGDA contract that ensures that no municipality can adopt a sales and use tax targeted to the gas pipeline project.

Local property taxes. The vast majority of property related to a proposed gas pipeline would not be subject to AS 29.45 property taxes. Under current law, the only oil and gas property taxable under AS 29.45 is major offices that require commensurate municipal services (police, fire, emergency services, road and street maintenance, water and sewer utilities, etc.). Local property taxes assessed under AS 29.45 would not be material to the gas pipeline project, so the Municipal Advisory Group recommends against inclusion of local property taxes under AS 29.45 in a SGDA contract.

Municipal special assessments. The study team was unable to find any municipal special assessments, franchise taxes or other municipal taxes and levies that would be material to a SGDA contract. Two municipalities outside the pipeline corridor assess severance taxes on gravel and coal. The Municipal Advisory Group indicated its willingness to accept SGDA contract terms that would not allow targeting of municipal special assessments, franchise taxes or other municipal taxes and levies to the oil and gas industry.

Oil and gas production property taxes. The Municipal Advisory Group extensively explored the costs and benefits of each of the possible taxes that could become a negotiated PILT, and the benefits and costs of providing tax certainty to the builders of a

gas pipeline project in exchange for a PILT. It became clear that the municipal imposition of property taxes on oil and gas property under AS 43.56 were the only taxes that

- Could potentially be significant to the economics of a gas pipeline project;
- Do not involve administrative or logistical challenges exceeding the benefits that might accrue from an exemption for pipeline sponsors from the tax; and
- May provide an opportunity for creative benefits to accrue to both pipeline sponsors via deferred tax liability and the municipal governments via revenue stream certainty.

The focus of analysis of revenue impacts in this report is therefore on AS 43.56 property taxes – for both municipalities and the State of Alaska – and the shape of the property tax stream during gas pipeline operations.

The Municipal Advisory Group members were willing to consider a PILT for AS 43.56 taxes under several conditions:

- The estimated net present value of PILT payments is equivalent to the estimated net present value of property taxes that would otherwise be paid without a SGDA contract;
- The value of PILT payments is based on the current 20-mill state tax, leaving opportunities for municipalities on the pipeline corridor (or having gas pipeline personal property within their boundaries) to change property tax rates based on changing conditions in their territory, and allowing opportunities for new municipalities to form in the unorganized borough portions of the pipeline corridor;
- The property subject to PILT is treated in the same fashion as other mandated exempt property in Alaska in full and true value calculations, and that PILT payments are not treated as tax revenues for purposes of state or local tax caps; and
- The PILT payments are paid directly by the gas pipeline sponsors to municipalities, as are municipal property taxes, based on an allocation plan (yet to be determined) that recognizes changing conditions.

The primary impacts to municipalities from a PILT that replaces AS 43.56 taxation are:

- The value of the PILT over time, compared to tax revenues
- The shape of the PILT revenue curve
- The effect of the PILT on state aid for education
- The effect on state and local revenue caps of the mandated property tax exemption for gas pipeline properties

PILT VALUE OVER TIME

The first condition, that the estimated net present value of PILT payments be equivalent to the net present value of property taxes that would otherwise be paid, requires an analysis of the possible assessment of gas pipeline and related property. Assessment of

oil and gas property is the responsibility of the Alaska Department of Revenue. The assessment of the TAPS system has been the subject of continued discussion, dispute and appeal during its 30-year life.

The effect of either of these models is to front-load property taxes on the gas pipeline project – the assessed valuation of the project is highest at the beginning of the project and declines over time. Based on our estimates of cash flows during the pipeline construction, and the schedule included in the introduction of this report, property taxes would be levied by the State of Alaska and municipal governments during the gas pipeline life as shown in the following chart.

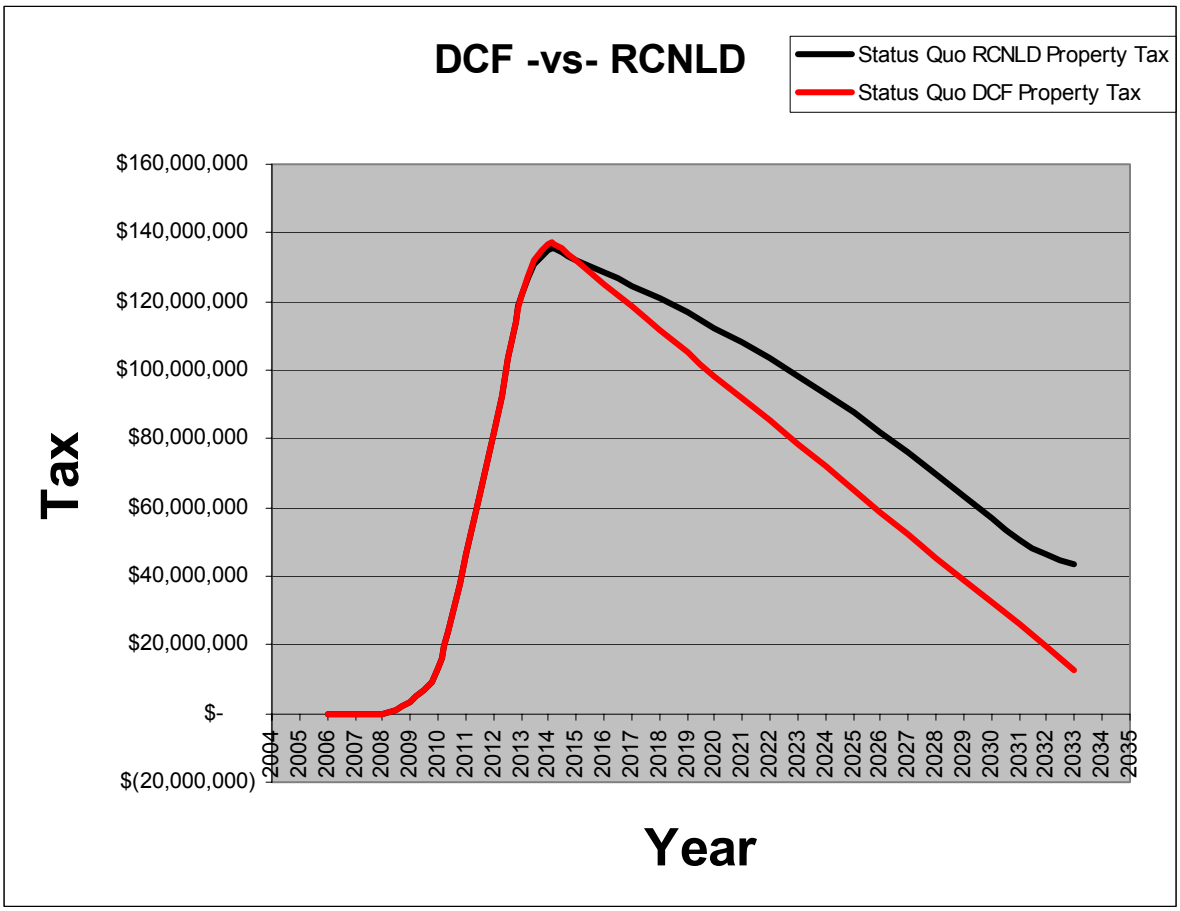


Figure 25.Status quo property taxation of the gas pipeline

This tax structure shown in Figure 25 above creates problems for both pipeline owners and for municipal governments. For pipeline owners, the higher tax levels in the early years increase the time to recover capital costs and reduce net income. For municipalities (and the state), the rapid ramp-up in taxes creates demand for services that cannot be sustained as property values fall. The Alaska municipalities with TAPS properties – the North Slope Borough, Fairbanks North Star Borough, and City of Valdez – have for most of the past 25 years had to deal with consistent reductions in pipeline property valuation and resultant taxes.

THE SHAPE OF THE PILT REVENUE CURVE

One of the concepts behind the SGDA was that if the tax curve could be flattened – with a PILT lower than property taxes in the early years and higher than property taxes in the later years, both the pipeline owners and the municipalities could benefit.

The benefits of a flatter taxation and revenue shape may be greater based on the discount rate used to ensure the PILT has a net present value equivalent to the AS 43.56 property taxes. That increase is due to the differing perspectives of present value used by public and private entities. Generally, governmental entities considering present value of a revenue stream would use their tax-exempt borrowing rate as a discount rate – currently in the four to five percent range. An appropriate discount rate for cash flows for a private entity could be the weighted average cost of capital for that entity. The two rates are different, creating an opportunity for both the pipeline owners and governments to realize, from their separate perspectives, an improvement to the net present value of their respective revenue flows. For purposes of the charts shown later in this section, we have assumed a discount rate of the average of municipal and private costs of capital.

The Department of Revenue developed a property tax model that calculated several options for the shape of PILT payments using the constraints set by the Municipal Advisory Group. The model shows some options for shaping the stream of gas pipeline revenues to municipalities, yielding PILT revenues to municipalities that would (a) recover the tax revenues lost during a gas pipeline construction PILT, (b) provide a PILT that is level through the life of the gas pipeline, and (c) provide a PILT that increases at a presumed rate of inflation (but which starts at a lower rate than the flat PILT).

Assumptions for the PILT Payment Model

- Term of project is defined as the 20-year depreciation life plus the difference between the first year of investment and commencement of throughput.
- Floor value for RCNLD valuation: 20 percent
- Level of throughput: 4.5 BCF
- Municipal discount rate: 4.0 percent
- Return on Sponsor Group equity: 18 percent
- Cost of Sponsor Group debt: 6.0 percent
- Sponsor Group debt-equity ratio: 80 percent debt, 20 percent equity
- Weighted average cost of capital for Sponsor Group: 8.4 percent
- Discount rate for determining NPV equivalent: 6.2 percent (average of municipal discount rate and Sponsor Group weighted average cost of capital)
- PILT escalator: 3.0 percent
- Replacement cost trend rate: 2.0 percent per year
- Investment schedule is approximated on a best-guess scenario given the availability of public data.
- Construction PILT payments are based on the Information Insights impact model

The two models are similar in the shape of revenue curve they yield – each has a base case that matches the curve above; for each the factored tax increases the magnitude of the early peak with a steeper decline; the shapes for either the flat PILT or increasing PILT are similar.

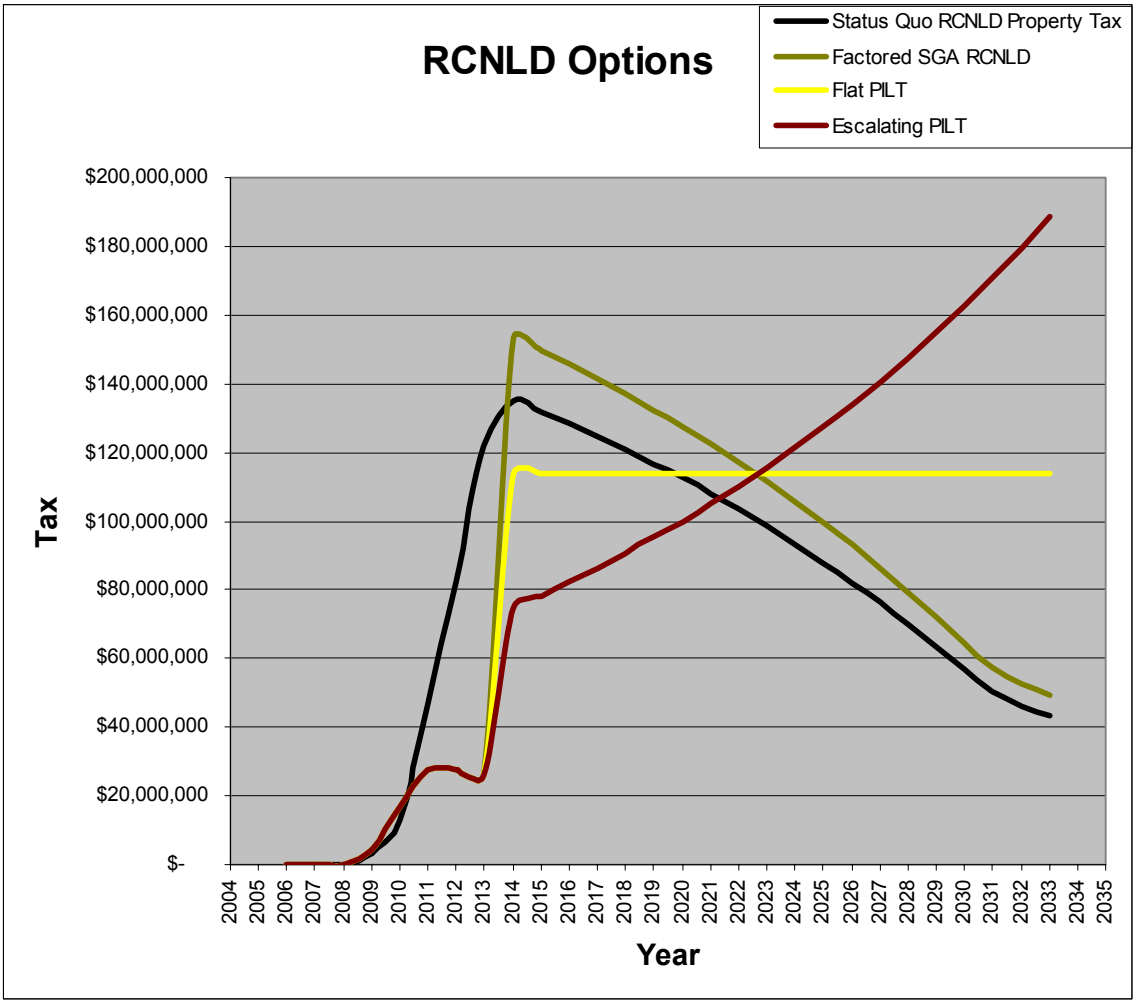


Figure 26: RCNLD PILT options

The flat and escalating PILT structures offer potential benefits to both pipeline owners and municipalities, but may create new problems. The clearest issue raised is what happens at the end of the SGDA contract. Upon contract expiration, if the PILT is replaced by the 2004 status quo taxation, municipalities could see a precipitous drop in revenues. Using the flat rate PILT in the DCF options shown in Figure 27 below, for example, yearly revenues of nearly $100 million in 2033 could drop to less than $20 million in 2034.

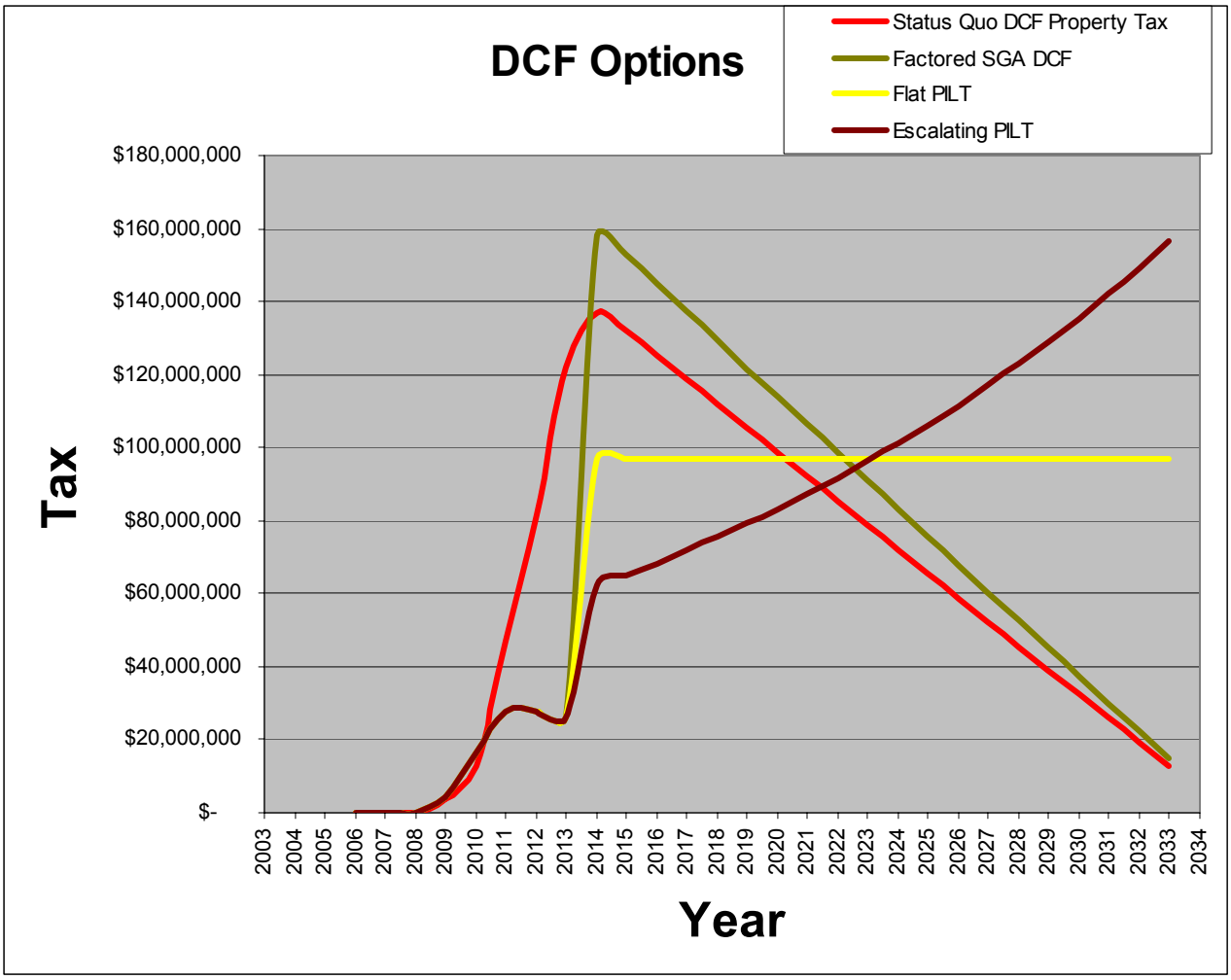


Figure 27: DCF PILT options

Valuation of oil pipeline properties has been a contentious issue since oil started flowing from Prudhoe Bay. The North Slope Borough, the Fairbanks North Star Borough and the City of Valdez appealed several TAPS property assessments in the past decade as being too low. The owners of TAPS argued the assessments were too high. TAPS value is now based on throughput as opposed to cost of commodity or replacement cost less depreciation. This valuation methodology is in its second year of a three-year trial.

The Municipal Advisory Group considered a production-based PILT for the gas pipeline, recognizing that such an approach could offer a solution to the revenue "cliff" at the end of the SGDA contract. The group recognized that such an approach would result in the municipalities accepting some of the risk of short-term production disruption in exchange for longer-term revenue certainty. The group approved a resolution accepting in principle a production-based PILT, charging a fixed cents-per-mcf (or fixed plus escalator) amount based upon throughput.

This approach is shown in the following throughput-based model.

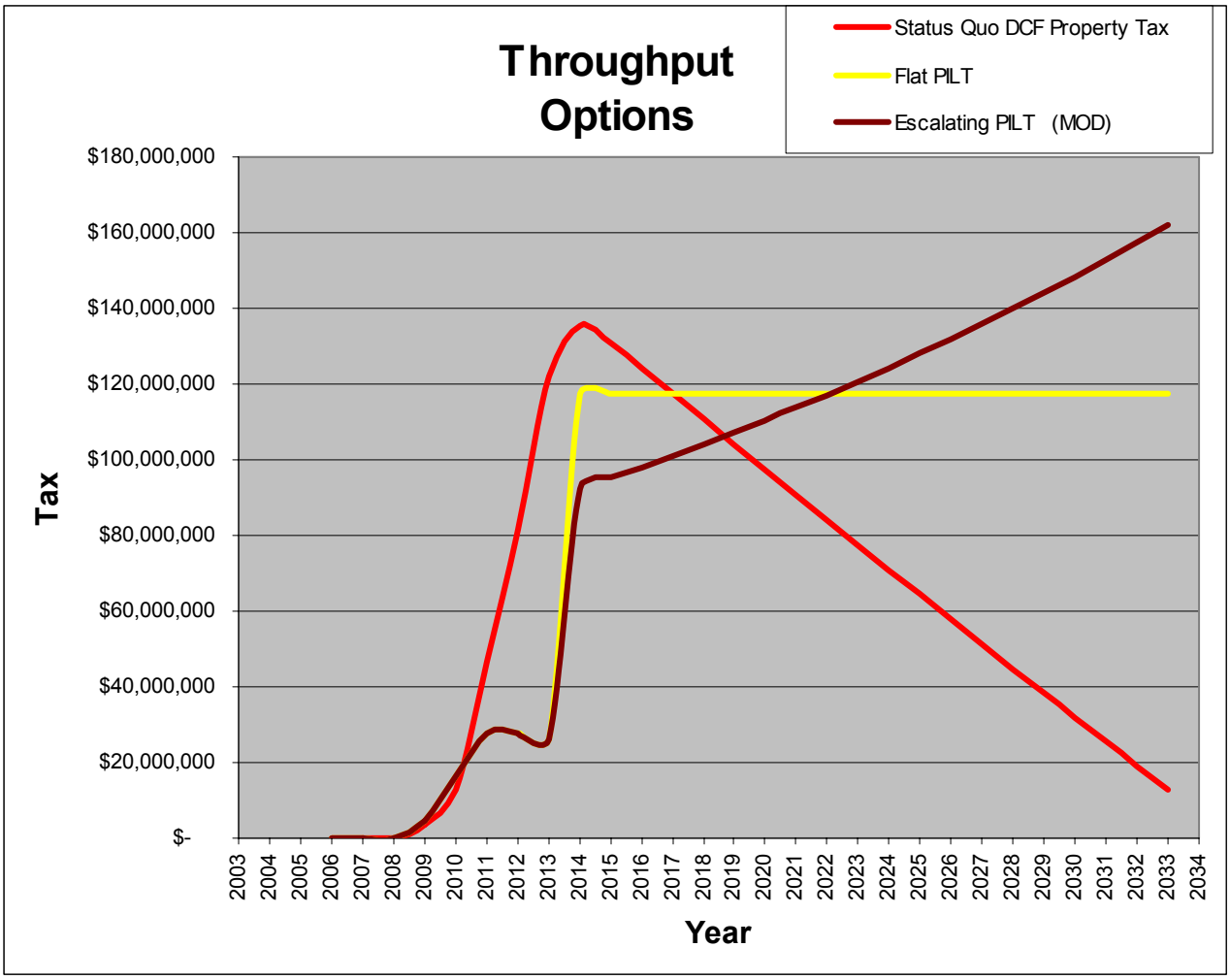


Figure 28 Throughput-based PILT models

IMPACTS ON STATE FUNDING FORMULAS

If properties associated with construction of a gas pipeline are removed from the existing oil and gas property tax structure, the question remains how to handle valuation of those properties.

Alaska Statute Title 29 requires the state assessor to assess all taxable real and personal property at its full and true value each year. That statute requires all property be included in the full and true value determination, except property that is statutorily mandated exempt from taxation. Existing exemptions include senior citizen and disabled veterans property tax, property used exclusively for religious purposes, property used for educational purposes, and state and federal government property. [Property that is exempt from taxation by a local, optional exemption is included in the full and true value.]

The Municipal Advisory Group assumed that property exempt from taxation under a SGDA contract would be treated in the same fashion as other statutorily mandated

exempt property. This interpretation is essential to the Municipal Advisory Group's consideration of the PILT alternatives and to support for a SGDA contract containing a municipal PILT.

Impact on state funding formulas. Full and true value plays a significant role in determining funding levels for state aid to education and for the Safe Communities and State Municipal Revenue Sharing programs. The state did not fund Safe Communities and Municipal Revenue Sharing in FY04. If that program remains unfunded in future years, the valuation of gas pipeline facilities will not be an issue for this program.

State aid to education is, however, a major issue. The education foundation formula is a complex formula that calculates "basic need' for education by school district. Basic need is derived by calculating student enrollment, school size, a state approved cost factor, special education needs, and the number of correspondence students. Once basic need is determined, it is reduced by the minimum amount that the local taxpayers are mandated to pay and by a certain percentage of federal funding received by the school. The result – basic need less a required local contribution and the percentage of federal funding – is the amount of state aid to a school district. Local school districts have the option of increasing their support above the required minimum, subject to a maximum contribution level.

The required local contribution is calculated in one of two ways. The majority of Alaska municipalities' local contribution is calculated at the equivalent of a four-mill tax levy on the full and true value of all taxable property within the school district from a base year of 1999 and the equivalent of four mills on half the increase (two mills) in full and true value over subsequent years.

The second method for calculating required local contribution is 45 percent of the prior year's basic need as defined by the state. Communities using this calculation method are the North Slope Borough, City of Valdez, City of Skagway, and City of Unalaska - using the four-mill method in these communities would result in unrealistic funding levels.

Under the four-mill method, as local assessed values increase, so does the required local contribution, resulting in a lower amount of state aid. It is therefore important to those local governments that use the four-mill method that any gas pipeline properties that would be exempt from taxation under an SGDA contract are not included in the state assessor's full and true value determination. Otherwise, these governments would see an increase to required local contribution without a corresponding increase to their revenues. Communities using the 45 percent of basic need calculation would not be affected by the inclusion of the value of non-taxable property in the full and true value determination.

At the July 9, 2004 meeting of the Municipal Advisory Group, members discussed the potential impacts of including the value of gas property tax exemption under SGDA in the calculation of full and true value determination and per capita limits to municipal taxation. The Department of Revenue asked the Attorney General for an opinion on the issue. DOR staff reported at the July 22, 2004 Municipal Advisory Group meeting that the Department of Law would not be issuing a written opinion regarding including value of exempt property for determination of full and true value. There is no case law, so a definitive statement cannot be made based on existing statutes.

Under current practices, if an exemption from property tax is mandatory the value is not included in the full and true value determination. Assuming the verbal indication from both the Departments of Law and Revenue holds true, education formula funding, in terms of state aid to education, would not be impacted.

IMPACTS ON REVENUE AND TAX CAPS

Impact on state restrictions on municipal taxation. From a municipal perspective, property or *ad valorem* taxes are fairly simple – the Latin *ad valorem* means "according to value". A municipality assesses the value, establishes the mill levy or tax rate and supports the process with the ability to foreclose or place a lien on the property. The tax rate applies equally to all residents and businesses within its boundaries. Depending on their location, property owners pay some or all of the areawide mill rate, the non-areawide mill rate and any service area rates.

With the 20-mill rate levied and collected by the state, as a municipality's tax rate increases or declines, the tax credit amount via the state follows the changing circumstances. The tax rate remains constant for oil and gas properties.

In the first resolution the Municipal Advisory Group adopted, the member municipalities noted that a fixed line-wide PILT might not allow for changing conditions, such as those created by new voter approved bonds, increased mill rates and formation of new local governments. The group requested that a PILT structure recognize the loss to present and future forms of local government of the opportunity to respond to changing conditions through changing tax rates.

The Municipal Advisory Group reached consensus that the 20-mill limit on oil and gas properties provides flexibility for changing circumstances in municipal governments. The group also concurs on the need for a reasonable and transparent method for valuing a gas pipeline and determining a PILT.

Tax and revenue caps. Six municipalities that are members of the Municipal Advisory Group have some type of revenue or tax caps that must be acknowledged when considering PILT structures for a gas pipeline project. The Municipality of Anchorage, the Fairbanks North Star Borough and the City of Fairbanks have similar revenue caps set at the previous year's revenue, plus CPI, new construction, bonding, voter approved services, taxes for new judgments and special appropriations on an emergency basis. The Kenai Peninsula Borough has a borough tax cap set at 8 mills. The City of Valdez has a tax cap set at 20 mills; the cap dos not apply to payment of bonds. The North Slope Borough has no local tax cap.

Two municipalities will have the largest revenue impact from the gas pipeline project – the North Slope Borough and the Fairbanks North Star Borough. The North Slope Borough's tax revenues are limited by the state formula described earlier in this report – capping taxable property at 225 percent of the statewide average per capita assessed valuation.

The Fairbanks North Star Borough has a voter-ratified tax revenue cap adopted by initiative. It may not be modified or negated by ordinance within two years of its

effective date. Petitioners gather enough signatures to put the tax revenue cap back on the ballot every two years. The FNSB tax revenue cap limits the total amount of municipal tax that can be levied or imposed during a fiscal year. It does not adjust for reductions or increases in state revenue to the borough. The amount of municipal tax that can be levied or imposed during a fiscal year cannot exceed the total amount approved by the borough assembly *for the preceding year* by more than the percentage increase in the federal CPI for Anchorage. There are exclusions to the cap – the taxes on new construction or property improvements; the principal and interest due in the next fiscal year on bonds, less state reimbursement for school construction debt; taxes to provide voter-approved services; taxes for new judgments; and special appropriations necessary on an emergency basis.

FNSB tax revenues derive almost exclusively (98 percent) from property taxes. The FNSB cap is designed to limit tax revenue; if the borough were to adopt a new tax, such as a personal property tax on motor vehicles, property taxes would have to decline by the same amount of revenue generated by the new tax. In addition, since the basis for setting the next fiscal year tax cap is set on the preceding year's approved revenue, if the revenue budget does not go "up against the cap" the ability to add that new tax revenue to the cap is forever lost.

If the gas pipeline project is not valued and not subject to taxation under AS 43.56, there will be no specific impact in the short term to the FNSB or similar tax revenue caps. A PILT will not be considered tax revenue, and as such, will fall outside the realm of the tax cap.

IMPACTS TO CHANGING LOCAL CONDITIONS

Impact on unorganized boroughs and boroughs in process. The Alaska Constitution, in addition to prescribing forms of local government, also requires that the entire state be divided into organized and unorganized boroughs, based on standards such as natural geographic boundaries, economic viability and common interests. In general, organized boroughs have formed in those areas where economies were better developed. A large portion of the state has not incorporated into organized areas and carries the designation of unorganized borough.

The authors of the constitution attempted to create a system of local government that would be flexible enough to meet the desire for local control help to develop local economies through regional organization. Entire regions of the state were without basic services or substantial cash economies while other parts of the state were developing resources and attendant industries that could provide a tax base strong enough to provide services. The constitution did not mandate creation of incorporated local governments throughout, but recognized the need for the unorganized borough. The state legislature serves as the governing body for the unorganized borough and has oversight of services that would be provided by organized boroughs, perhaps most notably education.

Organized areas have a tax base to support services, while services in the unorganized areas are funded totally by the state. Given the wide range of options for local government powers, many people perceive inequities among types of local governments.

In 2002 the Alaska Legislature directed the Local Boundary Commission (LBC) to determine which areas of Alaska's unorganized borough met the standards for incorporation of boroughs. The Local Boundary Commission reviewed conditions in the unorganized borough and reported to the legislature the areas it identified that met the standards for incorporation. The LBC report, *Unorganized Areas of Alaska that Meet Borough Incorporation Standards (*February 2003), identified seven regions in the unorganized borough that met standards for borough incorporation.

While mandating the Local Boundary Commission to undertake a review of the unorganized borough and passing legislation to encourage a natural gas pipeline do not conflict, the two issues have potential intersections.

In determining the incorporation standards for areas of the unorganized borough, economic capacity of the region is a prime consideration. Economic capacity is based on 1) anticipated borough functions; 2) anticipated expenses; 3) anticipated income; 4) ability to generate and collect local revenue; 5) economic base, land use, existing and reasonably anticipated industrial, commercial, and resource development; 6) property valuations; 7) personal income; and 8) prior borough feasibility studies.

The existing AS 43.56 structure, with its 20-mill maximum local tax levy, allows future local governments to access a potentially important part of their tax base. Should a local government form in a portion of the unorganized borough with pipeline properties, that local government would collect taxes from pipeline owners at that local government's tax levy rate, and the state would credit against its tax levy the amount paid to the local government.

The creation of a PILT structure under SGDA needs to address changing local conditions, both in existing municipalities and to accommodate the needs of potential local governments. Delta Junction is currently examining the creation of a new borough in its area. The Local Boundary Commission report recommends the creation of an Upper Tanana Basin Model Borough. The regions under review are large, with population densities that range between small communities and wilderness, making delivery of services greatly more expensive than in urban areas.

The Municipal Advisory Group recognized the importance of ensuring a solid tax base in any future governments, and asked the state to ensure the PILT structure recognizes the loss to present and future forms of local government of the opportunity to respond to changing conditions through changing tax rates.

VIII. Subsistence and Socio-cultural Impacts

This report cites likely impacts of gas pipeline construction and operation on subsistence resources and places them within a context of socio-cultural impacts. Studies of harvest data and confidential assessments by gas pipeline developers or other entities fail to tell the story adequately. Subsistence and socio-cultural effects of industrial developments, especially in remote areas of Alaska, tend to have a disproportionately high level of impact (real and perceived) on subsistence-oriented residents of rural communities.

A comprehensive assessment of predicted impacts must include first-hand experiences of people who understand and have participated in the cycles of life in rural Alaska. Adequate testimony and interviews during the EIS process, combined with analysis of data such as harvest reports, may begin to overcome the shortcomings of previous EIS activities.

Substantial portions of the following discussion of subsistence and cultural issues and projected impacts of the gas pipeline are drawn from the report "Summary of Subsistence Issues and Concerns for the North Slope, Northern Interior, and Upper Tanana Areas, Volume I." (Betts and Bowers 2004; see also NLUR 2000). The complete report has not been released, because it includes confidential information that the Sponsor Group has not approved for release at this time. Beyond that report, other published sources are cited as appropriate; people who live and work in the affected areas provided valuable (published and unpublished) information.

Factors affecting resource harvest are part of a complex economic, social, cultural, and political web of inter-related issues that are not easily separated into distinct criteria or clear cause and effect relationships. The focus here is on subsistence as legally defined with direct, indirect and cumulative effects established through the Council on Environmental Quality and the National Environmental Policy Act of 1969.

Potential subsistence impacts from construction and development projects in Alaska have generally been discussed in the context of three principal direct impact criteria: (1) availability of resources, (2) access to resources, and (3) competition for resources (EPA 2003 Section 4.13). We have added the issue of realignment of priorities within rural communities.

Availability of resources. Factors relating to resource availability include changes in the abundance, displacement, contamination, or health of a resource. These concerns directly affect the people who rely on the resources. Issues include how to maintain resource abundance and how to avoid or mitigate habitat disruption and contaminant pollution due to industrial development activities. Abundance and availability may be linked, depending on circumstances. Even at relatively low resource population levels, local availability can be high (i.e. fish in spawning aggregations). Conversely, at high population levels availability may be low (as in deflection of migrations, changes in seasonal distribution, and regulatory constraints). Availability is of primary importance to subsistence dependent users, while abundance is a critical factor of resource population dynamics.

Access to resources. Development and new technology – new roads, industrial or residential development, improved transportation, and such technology as snow machines and outboard motors, result in increased access to subsistence resources, or physical, regulatory, and/or social barriers may affect access.

Competition for resources. Factors that relate to competition for resources include new and usually non-local users, construction project personnel, or existing users who harvest resources more frequently as a result of new or improved access to traditional use areas.

Realignment of priorities within rural communities. The changes that accompany industrial activity place pressures on local residents – working in the industrial setting and allocating time for subsistence activities being one of the more obvious. Access to supportive technologies may increase subsistence harvesting, while working outside the community may decrease opportunities to participate in subsistence activities. These conditions may create altered time and space patterns of subsistence resource use.

Many view subsistence both as an economic activity and as the primary means by which they identify themselves ethnically and culturally, and some have a more secular perspective. Subsistence is one way that Alaska Natives people maintain their cultural identity and distinguish themselves from non-native Alaskans who may also rely to some extent on hunting and fishing to supplement their incomes, or who may engage in hunting and fishing for strictly recreational reasons. Rural economies rely on a complex continuum of opportunity, income, community needs, personal decisions and subsistence patterns.

Additional related subsistence concerns include:

- How to optimize employment of people from villages along the gas pipeline route with minimal disruption to provision of traditional foods and cultural activities
- Understanding that greater economic activity in villages will improve some aspects of quality of life, but may negatively affect other conditions
- Climate change. The Arctic Council study to be released in November 2004 joins a growing body of scientific work and traditional knowledge clearly identifying that climate change is occurring, impacting northern indigenous peoples, and accelerating.
- Complex interactions between climate change, industrial activity, subsistence resources and subsistence activities.

Harvest data reveal trends in the nature and distribution of subsistence resources being used in a specific community. The data provide a sense of those resources that are likely to be the most important, particularly if we assume that the subsistence resources that are most heavily harvested or utilized accurately reflect resources that are most important to local residents. Details about harvest numbers and areas may also illustrate the transportation modes that people rely on to conduct their subsistence activities, and a sense of where people go to hunt, fish or gather. (Harvest data and other subsistence characteristics of individual villages and communities appear in Volume II of the 2004 NLUR study. See Betts and Bowers 2004, NLUR 2000, and other sources incorporated by reference.)

A socio-cultural approach. Even if accurate harvest data are available and sufficient for the definition of subsistence trends through time for all villages within or in close proximity to proposed development, it will still be necessary to evaluate these trends within a framework of risk as perceived by villagers. Effects on subsistence must be viewed within the context of socio-cultural impacts – the aspects of gas pipeline development that will be most difficult to quantify require the greatest effort to talk to people. A comprehensive assessment of predicted impacts must include first-hand experiences of people who understand and have participated in the cycles of life in rural Alaska. Adequate testimony and interviews, combined with analysis of data such as harvest reports, may begin to overcome the shortcomings of previous EIS activities.

Employment of people from villages along the gas pipeline route will carry important risks as well as benefits. Greater economic activity in the villages will improve some aspects of quality of life, but may negatively affect other conditions. The absence of subsistence providers who leave to take construction jobs may reduce availability of traditional foods for significant numbers of people.

Availability and limitations of data. There is no single data set or source that will provide systematic information that is necessary to adequately define stability and/or change in harvest patterns by subsistence hunters and other resource users over the roughly thirty year period of North Slope oil and gas operations.

- The Alaska Department of Fish and Game (ADFG) subsistence reports vary in scope and quality by region and community. Most of the ADFG studies were conducted in the early to mid 1980s, with virtually no follow up because of internal reductions in personnel, and significant reductions in their yearly research budgets.
- The data needed to address trends in harvest patterns are widely scattered among state and federal agencies, including but not limited to the ADFG Wildlife Conservation Division, ADFG Subsistence Division, the Alaska Department of Community and Economic Development, the U.S. Fish and Wildlife Service, National Park Service, and the Bureau of Land Management.
- Multiple studies by the oil and gas companies and by the Minerals Management Service render many North Slope communities (Kaktovik and Nuiqsut in particular) better understood than others, especially when compared to communities in the Interior and Upper Tanana regions. This summary of subsistence issues focuses more heavily on projected impacts to communities between Delta and the Canadian border, which experienced fewer and less direct effects from TAPS construction and operation. As a result, subsistence issues related to development in this region have been less well studied and understood.
- In some cases community subsistence data are presented in summary form in technical reports prepared by agency personnel; in many cases critical data linger unsummarized or are at best recorded in field notes and other internal documents. For some of the communities there is simply a critical lack of substantive subsistence data apart from very general statements about the plants and animals people hunt, fish or gather, and what season(s) of the year are most important for subsistence activities.

- For most communities baseline data concerning subsistence resources are inadequate, in terms of specific harvest information, to develop a typical yearly harvest profile. Thus it is difficult, if not impossible, to assess future development impacts on the types and quantities of subsistence resources taken. The lack of yearly harvest data also makes it difficult to address change through time. Most of our research has resulted in the equivalent of a "snapshot" of yearly use for one or two years at best. Without the requisite data, fluctuations and patterns in resources are difficult to discover.
- Assessment of the per capita consumption of subsistence foods provides a numerical means with which to evaluate resource procurement and allocation patterns by village. Interviews and public meetings are essential to provide the narratives needed to evaluate the perceived impacts of the natural gas pipeline and associated developments on a subsistence way of life. At present, there is not enough specific, long-term harvest data for many communities for a realistic assessment of impacts on subsistence to be made, nor has there been adequate public input and testimony.

Legal issues and requirements. Section 810 of the Alaska National Interest Lands Conservation Act (ANILCA) directs federal agencies undertaking any project involving public lands in Alaska to study the effects on the subsistence use of natural resources, and to determine how any proposed effects might be avoided or mitigated. Section 810 further outlines the process for evaluating impacts on subsistence use and needs. In order to satisfy both the letter and spirit of ANILCA, the following four steps must be undertaken: (1) evaluation of the effect of proposed activities on subsistence; (2) preparation of a finding of effect/no effect on subsistence; (3) where there is a finding of effect (significant restriction) a public hearing is required; and (4) where there is a finding of significant restriction on subsistence, an 810 determination must be prepared.

Note that the legal requirement for agencies to define and mitigate or avoid subsistence impacts is distinct from the National Environmental Policy Act (NEPA) mandate to study environmental impacts, although several court cases have embraced and supported NEPA to determine the significant impacts threshold under ANILCA. The result of ambiguous and conflicting court rulings is that existing federal agency guidelines are somewhat inconsistent and generally do not conform with Section 810. As seems clear in the legislative history, Congress intended for Section 810 procedures to introduce subsistence early into project planning in order to protect subsistence resources and resource users from unnecessary adverse effects of any proposed federal undertaking or action.

Enough information already exists about potential real and/or perceived adverse effects from existing and future developments to subsistence to warrant public hearings as per the ANILCA mandate. Public testimony will enable the federal and/or state agencies responsible for the natural gas pipeline EIS to gather testimony from communities and individuals who have not yet had the opportunity to participate in the process, in addition to providing the opportunity to better explain the nature and extent of future development.

Environmental justice. Executive Order (EO) 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," provides

that agencies identify and address disproportionately high and adverse human health or environmental effects (including health, economic, and social effects) of programs, policies, and activities on minority populations, low-income populations, and Indian tribes. EO 12898 further directs agencies to collect and analyze data on the health and environmental risks borne by minorities in comparison to the general population. It provides a context within which, for these populations, a wide range of cultural resource issues can be addressed. The implications for subsistence are obvious, in fact the EO mentions subsistence in particular. There is an emphasis on involving the public in assessment, analysis, and decision making in order to identify and address environmental justice issues, with the order grounded in statutory law, including environmental law, civil rights law, and public administration law dealing with public information and participation. The EPA and the Justice Department have increased pressure on agencies to deal with this issue, although federal and state agencies continue to focus on subsistence as a traditional or even secular pattern of subsistence harvest and distribution. More recent studies, ones that remain to be incorporated in environmental impact studies and cumulative effects analysis, focus on community health and well being, diet and nutrition, and on food traditions and whole food systems analysis. This requires analysis of all food procurement activities and consumption patterns in a context of ecosystem research and human health effects.

DEVELOPMENT IMPACT SCENARIOS

For the most part, issues and impacts that will be the most difficult to define and mitigate are related to perceptions of the pipeline, and its impact on subsistence by people who live in the villages near and adjacent to it. General concerns about economic development across the state are often embedded in real and/or perceived threats to subsistence as a result of oil and gas development.

The environmental impact statement for the gas pipeline project will need to address the difference between past estimates of impacts to actual impacts from oil and gas development in the pipeline corridor. This approach will provide a basis to ensure the gas pipeline EIS does not underestimate impacts to the same extent that prior impact assessments have. Development of a gas pipeline will increase affected land and sea areas beyond those currently developed. It can be expected that a similar on- and off-shore proliferation of activity as that seen over the last 30 years will occur, adding to those areas already affected.

Development projects in general are linked by many observers to general social problems in the villages, i.e. television, alcoholism, suicide, accelerated culture change, and health and nutritional impacts from a reduction in the use of country foods, etc.

The following are real or perceived impacts that could occur from gas pipeline development:

- Contamination could occur to the water table, streams and rivers, resulting in death to fish, death to fish habitat, disruption of cycles of procreation, non-safe drinking water for animals and people, tainting of meat, and contamination of vegetation.

- Fish are a stored and expedient resource of considerable importance in the diets of many villagers located along the pipeline. No fish would result in reliance on store bought foods, or would possibly necessitate some form of a relief effort (as in the case of the Yukon Kuskokwim Delta over the past few years). Going to fish camp each summer and fall is a cultural issue of great importance, in part because it is akin to traditional patterns of seasonal movement prior to the establishment of permanent villages. Not being able to fish would be devastating culturally, and would probably result in the loss of considerable traditional knowledge.
- Erosion of river and streambeds, in possible combination with siltation due to gravel extraction, construction, and/or improper culvert installation may displace or reduce in number freshwater fish populations. The loss of freshwater fish has direct implications for harvest activities and for cultural identity.
- For all development activities, the employment of villagers might result in a seasonal decline in subsistence hunting and gathering. Conversely, it would increase cash flow in the local economies.
- Construction, brush cutting, dust from roads, etc., has implications for habitat loss, both direct and secondary. Caribou, moose, ptarmigan/grouse, and berries are just a few of the subsistence resources that might be adversely affected by future development and maintenance of facilities and roads. Again, any significant reduction of habitat and wildlife population numbers has implications for subsistence harvest and for cultural identity.
- More people mean more waste. The U.S. Fish and Wildlife Service (USFWS) has documented the fact that improper waste disposal occurs during even a temporary population influx, with effluent contamination to streams/lakes/ponds, and that bears, wolves and other wildlife are attracted to landfills and dumps. This often results in their death by workers using the threat of life/property clause.
- Increases in sewage could occur from pump/compressor stations, construction facilities, camps, etc.
- Denial of access could occur to traditional hunting and gathering areas by federal and/or state agencies for security and other reasons. More development probably means less access to traditional use areas, in spite of the intent of ANCSA to provide land for traditional use by Alaska Natives.

IMPACTS OF PROPOSED GAS TREATMENT PLANT AND UPSTREAM ACTIVITIES ON NORTH SLOPE COMMUNITIES

What follows are some observations pertinent to the potential impacts on subsistence resulting from construction of a proposed gas treatment facility at Prudhoe Bay and related natural gas infrastructure on Alaska's North Slope. These points are drawn primarily from the most recent and available summaries of North Slope subsistence and

socioeconomic issues as defined in either Environmental Assessments, Environmental Impact Statements, or in Cumulative Effects studies. [13]

In general, activities required for future oil and gas development include road and corridor construction, pipeline construction, maintenance of facilities, construction of ice roads, dredging for gravel from thaw lakes for road building and maintenance, etc. These activities are expected to have direct, indirect, and cumulative effects on North Slope subsistence activities (NRC 2003). This is pertinent for caribou, fish and marine mammals. Bowhead whales and caribou in particular are nutritionally and culturally important to North Slope residents and are widely recognized as important symbols of the condition and well-being of North Slope environments. Any activity that disrupts the migration patterns, abundance and/or distribution of whales or caribou could have an adverse impact on subsistence, although weather, vegetation, disease, and predation, in addition to oil and gas development, could affect population dynamics (see NRC 2003: 106-116). Cause and effect relationships are sometimes difficult to determine, so caution should be employed in assessing direct and indirect effects.

North Slope communities and subsistence. The term "North Slope" here refers to the area from the crest of the Brooks Range to the Arctic Coast, from the Canadian border to Point Hope. The North Slope is defined, however, in various ways for differing scientific and cultural purposes. Here we refer to the coastal Alaskan communities of Point Hope, Point Lay, Wainwright, Barrow, and Kaktovik, the near coastal community of Nuiqsut, and the inland communities of Anaktuvuk Pass and Atqasuk. As the primary regional center, with virtually all North Slope Borough (NSB) administrative activities, and with the largest population, Barrow is important for all considerations of oil and gas development impacts. Given that many decisions about oil and gas development are channeled in one way or another through NSB administrators and politicians in Barrow, decisions made there affect all NSB communities in one way or another. This is especially true for oil and gas development offshore, and for all proposed exploration and development activities. The NSB has been strongly opposed to all offshore exploration, particularly with respect to seismic activities, but has generally been more favorable to onshore development (e.g., Ahmaogak 2003; Alaska Eskimo Whaling Commission 2003; NRC 2003).

In terms of geographic proximity, the coastal community of Kaktovik, and the near-coastal community of Nuiqsut are more likely to suffer or benefit directly and indirectly from oil and gas development. With the westward migration of development, particularly the expansion of exploration activities, increases in infrastructural development, and the planned spider web of road building from Prudhoe Bay to NPR-A, the western coastal communities will also be affected.

[13] *Assumptions and caveats*: This is a literature-based review only, and has not been reviewed by the communities participating in subsistence activities described herein. The available data cited here were collected for other projects and/or other specific management purposes. More accurate project-specific data that address both the actual use (past and current) of the specific areas to be affected and the potential impacts of the project on those areas should be collected in order to accurately understand potential subsistence impacts.

In general, the cumulative effects of oil and gas development may be spread more or less evenly among all NSB communities, although the smaller communities will tend to be less resilient to all impacts because of the constraints of population size, fewer local and regional economic opportunities, and through less access to and influence over the individual and institutional intermediaries in Barrow, Fairbanks, Anchorage, Juneau, and Washington, D.C. Indirect impacts will be scaled relative to the nature of the impact and distance to the gas treatment facility and proposed attendant developments, with direct impacts scaled and measured more accurately in terms of distance alone. Nuiqsut residents are most likely to be affected by a specific project involving construction of a gas treatment facility at Prudhoe Bay, and impacts to their subsistence resources and activities are addressed here. Kaktovik, Barrow, Atqasuk and Anaktuvuk Pass residents may also be affected, but more peripherally. The project is planned in an area listed as a recent subsistence use area – for multiple resources over the past 10 years, and for in the Alpine Satellite Development Plan Final EIS. Because construction of a gas treatment facility is likely to involve dredging of the sea floor in order to accommodate large barges, oil and gas development activities and their effects on whaling are primary concerns.

Between August and October, Nuiqsut whalers generally use an area (including the Beaufort Sea offshore from Prudhoe Bay), from the Colville River delta to Flaxman Island. The area of most intensive use is seaward of the barrier islands; however, some subsistence activity occurs shoreward of the barrier islands as well. Kaktovik whalers most intensively use an area from Camden Bay to Humphrey Point east of Barter Island. Barrow whalers generally use an area to the west of Harrison Bay, but may venture as far east as Cape Halkett (MMS 2003:II-15). An important base of operations for Nuiqsut subsistence whaling is Cross Island, for which MMS has recommended a 10 mile radius exclusion zone (note however, that this distance was chosen somewhat arbitrarily and that Nuiqsut requested a 50 mile zone; Ahmaogak 2003:VII-12). The map shown in the MMS EIS for Beaufort Sea Lease Sales (MMS 2003:Map 12) indicates historical use (1973-1986) of a somewhat broader area, from Harrison bay in the west to Camden Bay in the east.

Potential subsistence impacts. The following potential subsistence impacts may be expected from construction and operation of a large Gas Treatment Plant and related facilities near Prudhoe Bay. The categories listed below, and the discussions of subsistence seasonality and harvest intensity are derived from the most current data available: the Alpine Satellite Development Plan Final EIS (pages 302-303). (See also MMS 2003 and NRC 2003).

The marine mammal fauna off northern Alaska consists of three truly Arctic species: ringed seal (*Phoca hispida*), bearded seal, (*Erignathus barbatus*), and polar bear (*Ursus maritimus*); and four subarctic species: spotted seal (*Phoca largha*), walrus (*Odobenus rosmarus*), beluga whale (*Delphinaterus leucas*), and bowhead whale (*Balaena mysticetus*) that move into areas of proposed development seasonally from the Bering and Chukchi Seas (Ferrero et al. 2000; Frost and Lowry 1984; Lentfer 1988). All of the species are important for North Slope subsistence purposes as nutritional and dietary sources and as powerful symbols of North Slope Inupiaq culture. This is true for Barrow, Kaktovik, Nuiqsut, Point Hope, Wainwright, and Atqasuk. Any development activity

that affects the health and integrity of these marine subsistence species poses both a real and perceived threat to Inupiaq subsistence and cultural well being.

The activities most likely to affect bowhead whales and all other marine mammal populations are marine seismic exploration, exploratory drilling, ship and aircraft traffic, discharges into the water, dredging and island construction, production drilling, and increased noise. To date, there are documented effects of industrial noise, spilled oil and contaminant pollution on virtually every marine species (NRC 2003: 100-101; see also MMS 2003). The probable consequences are diversion of animals from their normal migratory path, possibly into areas of increased ice cover, and less use of the fall migration corridor as habitat, especially for bowhead whales.

Cetaceans. Bowhead whales generally migrate offshore during the spring and fall. Industrial activities (near shore dredging, operations, transportation, and noise impacts) could affect whale behavior. However, some activities, such as near shore dredging or excavation of a short approach channel for barge landings, can be accomplished in winter to avoid interfering with bowhead migrations.

Since Nuiqsut crews whale locally only during the fall (although some Nuiqsut crew members also participate in the spring hunt with Barrow relatives), the August/September timeframe is a critical window for potential impacts. This potential impact is likely the most important issue to consider when analyzing short-term (construction), long-term (operations) and cumulative impacts of the project.

The effects of dredging are uncertain, given that water depths and construction estimates for dredging depths are unknown to the writers of this document at this time. The EIS for the Beaufort Sea Lease Sales 186, 195 and 202 (MMS 2003:V-68) reports that dredging would be… "expected to affect some benthic organisms and some fish species within one km for less than one year or season. These activities also temporarily may affect the availability of some local food sources for these species up to 1-3 km (0.62 to 1.9 miles) distance during construction, but these activities are not expected to affect food availability…over the long term."

Construction activities planned during winter will avoid conflicts to the greatest extent. Open water marine transportation timing will be tight and will have to be carefully coordinated to avoid impacts. Sea ice habitats are not anticipated to experience major impacts.

Mitigation measures will be required to ensure the Nuiqsut and Kaktovik fall whale hunt is not affected by project activities such as boat traffic, seismic activities, and other industrial noise sources. Dredging operations and any disposal activities would need to be scheduled for completion prior to the fall bowhead whale migration. Some mitigation measures of possible interest to the development of a gas conditioning pant and related facilities are given in MMS (2003:II-9)).

Pinnepeds. Habitat impacts are not anticipated. Subsistence hunting of pinnepeds, particularly during the spring and summer, may be affected. Ringed seals may be encountered during winter construction and other project operations. Spring and summer bearded seal hunting may also be affected. The months of April, June, July and August

are times of high levels of subsistence hunting of these species. Data collected during Northstar construction (LGL and Greeneridge 2001) did not note impacts to ringed seals.

Polar bears. Habitat impacts are not anticipated since non-denning bears generally inhabit offshore pack ice. Any on-shore denning sites will need to be avoided. Subsistence harvests of polar bears often occur during fall whaling activities. Any project impacts that affect access to and/or participation in fall whaling may, by extension, affect polar bear harvest.

Fish. Habitat impacts may occur depending upon the nature of dredging activities, use of freshwater, etc. Increased turbidity and loss of nearshore foraging habitat may occur with dredging, although these impacts likely would be short term and localized and would not affect subsistence harvests (see MMS 2003:V-68).

Broad whitefish, least cisco, and arctic cisco are the important subsistence fish species harvested by Nuiqsut villagers, and fishing occurs year-round. According to Figure 3.4.3.2 -12 "*Nuiqsut Subsistence Fish Harvests by Month and Species 1994-95, 2000, and 2001*" over half of the fish were caught in October, and nearly half of the fish were arctic cisco. Some jigging for burbot and lingcod is done under the ice, and nets are deployed at fish camps generally up rivers away from the project area. Freshwater use for ice road construction and maintenance may be affect local fish populations, particularly overwintering freshwater fish. The use of water from fish bearing lakes and streams is an activity regulated by the State of Alaska which also monitors their cumulative effects, as well as the health of populations that are targeted for harvest by commercial, sport and subsistence fishermen.

Any development activity that impacts thaw lake ecosystems, specifically water depth, thaw lake energetics, drainage patterns, permafrost cover, or the lacustrine/terrestrial interface, will probably have a negative affect on Broad Whitefish, Arctic Cisco, and Arctic Grayling populations. Given that Broad Whitefish in particular are very important late winter and spring subsistence resources for North Slope communities, development activities will have an accumulated effect on subsistence. Causeway construction is another potential threat to all Broad Whitefish populations, with negative affects on population dynamics already established through environmental studies associated with causeway development over the last twenty years or so (see NRC 2003: 123-131).

Land mammals. Habitat loss, disturbance through increased noise, and the construction of new obstructions are the primary issues associated with this project that may affect caribou. The western segment of the Central Arctic Caribou Herd uses portions of the project area for its range. These animals regularly encounter drill pads, roads, pipelines and processing facilities. Impacts from the proposed project include habitat loss due to new roads, pipelines and pads; new sources of noise disturbance from construction, operation and maintenance sources, and new sources of potential disturbances due to new roads, pipelines and pads. Although some habitat will be lost, it is abundant in the area and is not expected to be a factor in long-term herd population cycles. Traffic strikes may increase with increased road and traffic activity, but this is not anticipated to be significant.

Nuiqsut hunters target caribou year-round, but they primarily harvest them in late summer and fall. The Central Arctic Caribou Herd population is currently over 30,000

animals (data from 2000 ADF&G reports); overall it is increasing in size. Moose hunting takes place in August and September south of Nuiqsut, away from the project area.

While the caribou numbers are not expected to be impacted, the construction of gas treatment and transportation facilities may disrupt migration routes, reduce the amount of land available for caribou hunting, and impede the access to traditional hunting areas. A possible mitigation measure would be to provide fuel costs for hunters who must make longer trips to reach caribou or other land mammals.

Birds. Habitat impacts may occur due to burial of nesting sites with either gravel or snow dumps; loss of habitat due to water removal from tundra lakes for ice road construction; and ice road impacts that delay thawing. Impacts are likely to be minimal due to the abundance of local habitat. Noise and visual disturbance may cause impacts, particularly during summer operations however these would likely also be minimal.

Nuiqsut residents harvest ptarmigan year-around and a variety of waterfowl and bird eggs when available. Ducks and geese are often harvested while conducting other subsistence activities such as jigging for cod and burbot. To the extent that these other activities are affected by planned project activities, bird/egg activities may also be affected.

Cumulative effects of natural gas development on North Slope subsistence. The most important issues regarding effects of natural gas development on subsistence resources probably center on future rather than past cumulative effects. Although the importance of subsistence to all Alaska Natives is clear as is the fact that future oil and gas activities has the potential to affect subsistence resources, it continues to be difficult to distinguish cause and effect through cumulative effects analysis. Based on recent environmental impact statements, the key subsistence concerns continue to be: (1) the possible effects of oil spills and contaminants pollution on the abundance and availability of subsistence resources, (2) habitat disruption associated with the expansion of oil and gas infrastructure on the North Slope, (3) access limitations for subsistence harvesting in or around industrial areas, (4) competition for subsistence resources, (5) disruption/displacement of migration routes and feeding areas for both marine and terrestrial mammals as a result of industrial activity.

Cumulative effects on the North Slope involve the synergistic effects of future gas pipeline and other oil and gas exploration and development activities. Both time and scale are important; cumulative effects tend to increase logarithmically with time, and differentially with respect to scale (local, regional, global). What is a direct impact at one scale and at one point in time, may well have a cumulative effect at another scale and at another point in time.

Much is known about the impact of climate change on industrial development activities, subsistence resources and subsistence activities, as well as the interplay between them With the exception of the 2003 NRC report, this has not been satisfactorily addressed in past environmental impact statements. Where past climate change was more on the order of millennia, more recent formal scientific studies and traditional knowledge applications show that the climate is changing much more quickly now than it did in the past. Perturbations and fluctuations in both weather and climate cycles are now on the order of yearly and decadal scales, rather than millennia, although the relationship

between long and short term cycles is still not well understood. Although the North Pacific marine system experienced rapid, significant change between 1976-1978, some evidence indicates a possible swing to a longer climate time regime (Norton 2002).

The Arctic Council study being released in November 2004 is expected to add significantly to the body of climate change knowledge. This should make it requisite to align planning and development with Native knowledge and scientific understanding of how the nature and rate of change affects infrastructure development and subsistence resources. With respect to climate change, the major problem for planners is how to deal with uncertainty.

Recommended programs, projects and mitigation activities

- Funding to the Alaska Eskimo Whaling Commission for site-specific bowhead whale monitoring program and funding for meetings to negotiate Conflict Resolution Agreements with industry and the federal/state governments.

  The Alaska Eskimo Whaling Commission (AEWC) was formed in 1977 to represent whaling communities and coordinate with agencies responsible for the management of subsistence whaling. The commission now works cooperatively with the International Whaling Commission (IWC) and NOAA to promote these ideals:

  - Preserve and enhance a vital marine resource, the bowhead whale, including the protection of its habitat;
  - To protect Eskimo subsistence bowhead whaling;
  - To protect and enhance the Eskimo culture, traditions, and activities associated with bowhead whales and subsistence bowhead whaling;
  - To undertake research and educational activities related to bowhead whales.

- **Nuiqsut subsistence study**, or synthesis of existing data if adequate. The US Department of the Interior's Minerals Management Service (MMS) and industry (mainly ConocoPhillips) have funded several studies in the past as related to offshore and NPR-A oil and gas leases, so this may not be needed. However, data gaps should be identified and data collection needs to be brought up to date, and include all affected state lands. Any cumulative effects studies should be coordinated with the ongoing NPR-A and MMS studies of cumulative effects.
- **Kaktovik subsistence study,** or synthesis of existing data if adequate. See above.
- **Cultural resources inventory and assessment,** required under Section 106 of the National Historic Preservation Act and the Alaska Historic Preservation Act. The applicant almost always pays for such studies. If a large gas pipeline project is undertaken, however, funding should be provided for one position in the Department of Natural Resources, Office of History and Archaeology, to update and maintain site records (including GIS), and act as staff liaison between industry, federal and state agencies, and the Joint Pipeline Office.
- **Coastal Zone Management Consistency Determination**. Possible funding to Alaska Department of Natural Resources to determine if activities affecting coastal resources are consistent with Coastal Zone Management programs, as required by federally funded projects.

- **Funding to the NSB Planning Department, Inupiat History Language and Culture Commission (IHLC)**. Funds to be used to coordinate traditional land use inventory maintained by NSB Planning Department, to gather Traditional Ecological Knowledge, and coordinate interviews as needed in affected villages. NSB Planning Department should be involved with the borough's Wildlife Department in proposed studies. Both Planning and IHLC would be appropriate parties to be involved.
- **The Youth-Elders Conference on the North Slope**, a cooperative event run by both the NSB-IHLC and the NSB School District, is still an important cultural event that deserves support. One of the issues is conservation of past conferences' proceedings (preserving the audio tapes), and support for ongoing translations of past proceedings. Materials date back to the 1970s.

IMPACTS ON NORTHERN INTERIOR COMMUNITIES

Geographically, our use of "Interior" communities includes those located south of the crest of the Brooks Range, south and eastward to Delta Junction14. The analysis of subsistence impacts for this region is longer than that of Northern Interior in large part because the Upper Tanana has not had the background or experience of the TAPS project. This report begins to collect information for the Upper Tanana region that is oriented to impacts of industrial development. In addition to the points in this section, much of the general subsistence discussion in the Upper Tanana section also applies to the Northern Interior region.

Specific subsistence issues for the Northern Interior. The following points are drawn from the most recent and available summaries of Interior subsistence and socio-economic issues as defined in either Environmental Assessments, Environmental Impact Statements, or in Cumulative Effects studies[15].

- Increased access to the backcountry and traditional harvest areas by non-local hunters is of foremost concern to village residents and subsistence hunters. Increased access to tribal lands, increased tourist traffic, and an increase in the number of non-residents who use existing roads and infrastructure is a major issue for North Slope village

[14] Profiles of these communities are defined and described in a Northern Land Use Research, Inc. (NLUR) report (NLUR 2000) prepared for the reauthorization of and 30-year renewal for the Trans Alaska Pipeline System (TAPS). The TAPS reauthorization, including a summary of subsistence resources, is described in detail in the federal EIS (BLM 2002) and in the environmental report prepared by TAPS owners (BLM 1972). North Slope subsistence has been extensively reviewed elsewhere, and is incorporated herein by reference (BLM 1972; Galginaitis et al.; NRC 2003).

[15] Sources used to compile the following include: Draft Environmental Impact Statement for Renewal of the Federal Grant for the Trans Alaska Pipeline System Right-of-Way, July 2002, 4 Volumes, with Appendixes A through F; Cumulative Effects of Oil Development on Subsistence, A Report prepared by Everest Consulting Associates for the Alaska Oil and Gas Association, November 2001; Cumulative Environmental Effects of Oil and Gas Activities on Alaska's North Slope, National Research Council of the National Academies, 2003; Trans Alaska Pipeline System Corridor Community Profiles report prepared by NLUR, Inc., Fairbanks, Alaska, (2000); and, various "white paper" documents on file at Northern Land Use Research, Inc., in Fairbanks. Several of these documents in turn summarize subsistence data gathered for North Slope EIS effects (e.g. Liberty North Star, MMS lease sales, etc.).

residents. The typical scenario is for non-residents to use roads for recreational or other types of hunting and fishing, and for access to the Yukon River and tributaries. This places additional user demands on already taxed Yukon River fishery. Additional complaints include disturbance of subsistence cabins, increases in garbage and other litter, increases in road dust and noise, and an increase in incidence of vandalism. These concerns will be heightened with future oil and gas development, including construction of a gas pipeline.

- In the Yukon River Watershed, the villages of Tanana, Stevens Village, Manley Hot Springs/Eureka, and Minto collectively identify a problem with the increase in non-local hunters using the Dalton Highway for access via Hess Creek and the Yukon River Bridge (Betts 1997). For example, while the harvest of moose along the river by non-local hunters is thought to be negligible, residents believe that the noise and activity of increased boat traffic drives the moose from the river. Locally, moose harvest requires intensive effort. Many hunters use Game Management Unit (GMU) 20F to hunt in the winter if they were unsuccessful or did not hunt in the fall. Residents report that subsistence hunters often wait for the winter season in GMU 20F because of the number of non-local moose hunters in the area during fall. These concerns will be heightened with future oil and gas development, including construction of a gas pipeline.
- There is a general concern for protecting cultural resources on ancestral lands and subsistence resources from impacts created by access from the haul road, especially since road traffic is expected to increase as it is now open to the general public. It is difficult to separate the Dalton Highway as an existing state highway from its role as a section of pipeline service road. Clearly traffic has increased, and in combination with a growing Fairbanks population, the residents of Minto in particular feel that their subsistence resources are threatened. These concerns will be heightened with future gas pipeline development.
- **Alatna and Allakaket**: Increasing numbers of non-local moose hunters on the Koyukuk River during the fall season are resulting in a greater number of specific complaints from local residents. At present, there are many claims of overcrowding, increased competition, and wanton waste (ADFG 2004b). These concerns will be heightened with future oil and gas development.
- **Alatna and Allakaket**: Potential development of a transportation corridor between the Dalton Highway and the Kobuk River prompted concerns about potential adverse impacts on subsistence resources as a result of human population influx, and increased access. Allakaket residents favor continuation of the local controlled use area for moose hunting (no aircraft), in part because of their perception of oil and gas development in general, and the fact that moose populations are already quite low. Predations by humans on cow moose, and on spring and fall calves by bears are parallel problems for most if not all rural communities.
- **Anaktuvuk Pass**: Residents have expressed concern about the lack of caribou migrating through Anaktuvuk Pass in 1989 and during subsequent years. This prompted the community to request the Board of Game to close the area to the north of the community to non-local subsistence/sport hunting during August and

September so as not to disrupt the normal migratory pattern (ADFG 2004b). These concerns will be heightened through future oil and gas development.

- **Arctic Village**: Residents of the inland Gwich'in Athabascan community of Arctic Village have long expressed their concerns that caribou might be adversely affected by industrial development on the western part of the North Slope, particularly in the Arctic National Wildlife Refuge. The Refuge contains the core calving grounds of the Porcupine caribou herd. Funds should be directed to the Gwich'in Steering Committee to study socio-cultural concerns of the Gwich'in Athabascans, including Athabascan traditional land use on the North Slope.
- **Bettles/Evansville**: Residents expressed similar concerns about a proposed transportation corridor between the Dalton Highway and the Kobuk River. There are also multiple complaints about disruption of salmon streams as a result of mining (ADFG 2004b). More specific complaints focus on overcrowding, increased competition, and wanton waste (ADFG 2004b). Similar comments about competition for resources were noted during TAPS reauthorization meetings for Manley Hot Springs, Minto, and Stevens Village EIS (BLM 2002).
- **Wiseman**: At least one resident expressed general complaints about a perceived negative impact of TAPS on subsistence and cultural resources in the village of Wiseman: "My sister lived in Wiseman, but she can't go back there now. Too hard to get wood. And besides, pipeline spoil that place. Pipeline was going to really tear it off, you know. Good thing somebody run the line across above Wiseman so they don't want to break the old town up next (Nictune 1980: 26)."

IMPACTS ON UPPER TANANA COMMUNITIES

Subsistence, economic, and socio-cultural issues for the six Upper Tanana communities along or adjacent to the proposed gas pipeline route have not previously been summarized in the context of pipeline impacts (although it should be noted that previous pipelines have been built in this region.) These communities include: Healy Lake Village, Dot Lake, Tanacross, Tok, Tetlin, and Northway. Where communities consist of multiple population centers and in those cases where there are both Native villages and predominately non-native communities in close proximity, potential gas line impacts to subsistence harvest have been considered for the larger community as a whole, although where possible, demographic and economic data have been evaluated separately for population centers in close proximity.

The issues noted here are not exhaustive, nor are they prioritized in order of importance to the communities reported on. They have emerged through the course of conducting an office-based review of subsistence documents and reports related to the Upper Tanana region. It should also be noted that most baseline subsistence data for Upper Tanana communities collected by the Alaska Department of Fish and Game, Division of Subsistence is derived from studies done in the 1980s and may not reflect the most salient current issues and concerns.

Historical Upper Tanana subsistence concerns drawn from a review of subsistence literature and Department of Fish and Game, Division of Subsistence website information are presented in this section and summarized in the chart on the following page. Other sources include a 1999 document published by Tanana Chiefs Conference's Tribal Environmental Restoration Program, *Final Report on Military Impacts to Tribes in Interior Alaska.*

Upper Tanana tribal leadership position

The Upper Tanana communities have stated that development of a natural gas pipeline must rely on direct consultation in interviews and meetings with local residents – the people who understand and have participated in the full range of harvest activities and who have a comprehensive view of the impacts of industrial development on social structure, cultural continuity and the interwoven nature of subsistence in these villages.

The president of the Tribal Council for the village of Tanacross requested the following statement to reflect the sincere desire of Upper Tanana tribes to support and be involved in the Alaska gas pipeline project. Jerry Isaac, President of the Tanacross Village Council, stated his tribe's position as one of the Upper Tanana tribes regarding the proposed gas pipeline. In addition to Tanacross, the Upper Tanana Inter-tribal Coalition includes: Northway, Tetlin, Dot Lake, and Eagle.

- The Upper Tanana tribes unequivocally support development of an Alaska Natural Gas Pipeline.
- Tribal government representatives expect to participate in all aspects of the proposed gas pipeline – planning and design – implementation – operations and maintenance. Participation must be understood to include:
  - Hiring at significant levels
  - Negotiated use of tribal lands for installation of support structures, lift stations, storage, service and related activities.

The tribes support an environmentally sound approach to construction, to include partnership between the sponsors of the gas pipeline, state and federal agencies, and affected tribes that shares the burden for mitigation of construction impacts.

Although the Upper Tanana region has had impacts from highways, tourism, commercial and military development for over 50 years, the communities have not had experience with TAPS. This region may experience high levels of real and perceived change during gas pipeline construction.

New road construction/improved access to subsistence use areas. At least three Upper Tanana communities (Healy Lake, Dot Lake, and Tetlin) have previously identified construction of new roads and/or improved access to traditional subsistence use areas as a negative impact on subsistence resources by increasing the level of harvest, especially by non-locals.

Urban or non-local competition for subsistence resources. Five out of the six Upper Tanana communities for which subsistence data was reviewed noted non-local competition for the harvest of wild foods was a major concern. These communities often attributed perceived depletion of certain resources to increasing harvest pressure resulting from improved access to subsistence harvest areas that attracted non-local users.

Encroachment on traditional trapping areas by non-local trappers and more frequent incidences of vandalism of cabins and camps has also been attributed to increasing use of subsistence resource areas by non-local users.

Federal and state management and regulation of subsistence resources. Five out of six communities expressed concerns that harvest regulations, bag limits, and permit systems sometimes prevented harvest of subsistence resources. This issue was noted more frequently than any other issue in the subsistence literature reviewed for specific Upper Tanana communities. Harvest regulations were perceived to limit access to certain species at times when those resources were available locally, restrict access to certain resources completely for some users (as lottery permit systems did), or not always take into consideration traditional seasonality of harvest (a particular issue for communities or individuals that might not have access to refrigeration or have the ability to transport meat quickly back to the village).

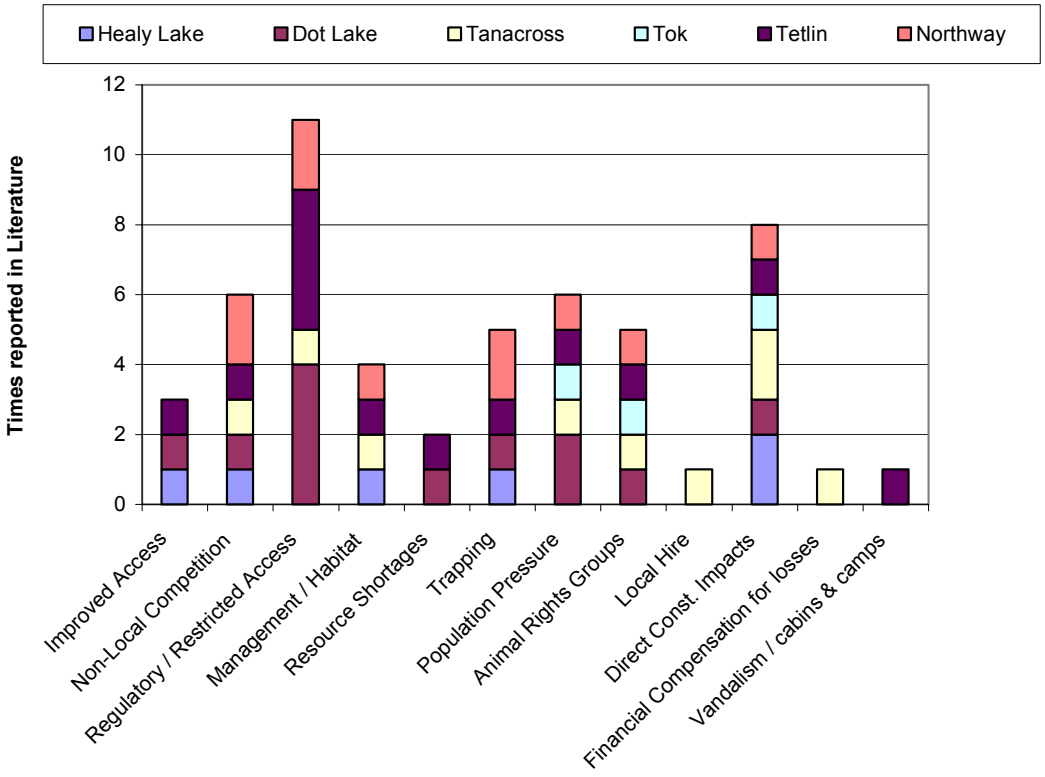


Figure 29: Historical subsistence issues reported for Upper Tanana communities

Resource shortages. Two communities (Dot Lake and Tetlin) reported decreasing populations of subsistence species that the community depended heavily upon. This becomes a critical issue in communities where species that contributed substantially to the subsistence harvest in the past (caribou for example) become less available as a result

of over hunting or changing patterns of migration, and the community shifts to a greater reliance on another species (moose) that then comes under greater hunting pressure.

Population pressure. The problem of increasing population pressure on limited subsistence resources has been noted as a concern in all five communities for which ADFG Division of Subsistence studies have been undertaken.[16] Some Upper Tanana communities such as Northway and Tok have experienced a great deal of population growth in the last few decades. With improved roads and the increasing availability and use of off-road vehicles, snow machines, power boats, and small aircraft urban residents from Fairbanks or military personnel from Ft. Greely, Ft. Wainwright, and other areas are increasingly moving into traditional subsistence hunting areas and coming into competition with residences of smaller communities that rely heavily on the use of wild foods.

Habitat/environment. Environmental quality concerns in the context of subsistence harvest is increasingly becoming a focus of subsistence-based communities. Wildlife habitat has been reported as a concern of four Upper Tanana communities (Healy Lake, Tanacross, Tetlin, Northway). On the other hand, the ADFG Division of Subsistence website reports that five of the six Upper Tanana communities reported on here (all except Healy Lake for which no ADFG data was collected) are concerned with the increasing visibility and activism of animal rights groups in Alaska. The influence of these groups is apparently being perceived as a growing threat to communities dependent on the harvest of wild foods.

Specific Healy Lake Village concerns reported in relation to the development of the Pogo Mine Project (Gerlach 2000; EPA 2003) have included those related to water quality and blasting noise and the potential impact on fish and wildlife populations in the mine vicinity. Road access corridor routes, as well as construction camp and airstrip locations have been a Pogo Mine issue, especially in the context of potential disruption of caribou migration routes.

Recently Alaska Native villages have begun to focus on chemical and toxic waste issues in relation to past and present development projects, especially those projects related to development of North Slope oil fields. Solid waste disposal, shoreline erosion, and the effect of contaminated water on the health of fish populations are all becoming of more concern to Alaska Native communities.

The TCC Real Estate Services program has been involved in cleaning up military debris on Native allotments throughout the Upper Tanana subregion since 1999. Tribal reports of military dumps and other environmental impacts now include 101 potentially impacted restricted Native allotments in Interior Alaska. Although most of these impacts occurred before 1971, the lands were later transferred to individual Tribal members without having impact mitigation.

The impact of climate change on the health, seasonal harvest cycle, and availability of subsistence species is another increasingly important concern of many subsistence-based Alaska communities. At the time most subsistence harvest data was collected by the

[16] Healy Lake was not studied by the ADFG Division of Subsistence, but was studied recently as part of the Pogo Mine development (Gerlach 2000; EPA 2003).

ADFG Division of Subsistence in the Upper Tanana Region, climate change was not the issue it has become today. The far-reaching impact of continued industrial development of oil and gas resources in Alaska and the long term environmental affects of an increasingly industrialized arctic and sub-arctic region is becoming an important issue to communities dependent on subsistence resources. The effects of climate change are complex and hard to evaluate in terms of subsistence issues but it is expected that this is a concern that will develop into a significant issue in Alaska as the impact of climate change on harvest of subsistence species becomes even more pronounced.

Construction impacts. Concerns about direct and indirect impacts of construction projects on subsistence resources were noted as a concern in all six Upper Tanana villages included in this review. The projects of most concern during the period in which subsistence information was being collected were the U.S. Air Force Backscatter Radar Receivers near Tok (proposed in the 1980s but never built) and the Pogo Mine Project on the Goodpastor River (currently under construction).[17] Both of these projects have parallels to the Alaska gas pipeline in terms of subsistence impacts (albeit on a much smaller scale). Some previous direct construction impacts identified as concerns in the context of these two projects but not yet noted within other categories above, include:

- **Loss of physical access to resources**. Loss of access to traditional subsistence use areas (especially trapping areas) as a result of the siting of a development project and associated roads, material areas, airstrips, etc. is an important concern expressed by most villages. In the case of the Back Scatter Radar receivers the area of potential effect was a five-mile radius around two receiver sites. The Pogo Mine Block (a much larger area of potential effect) includes areas that historically were traditional trapping areas for Healy Lake Village.
- **Economic issues**. Job training, local hire, and financial assistance to the infrastructure of a community impacted by a large construction project was only noted as a concern in Tanacross. However, this is a core issue in Alaska Native villages where access to wage employment has generally been very limited and where community services are often minimal. One resident of Tanacross believed the community should receive financial compensation for loss of access to a traditional harvest area in the vicinity of the Tok radar receiver.

  As money from wage employment flows back into a subsistence-based community, the ability to purchase equipment used for subsistence harvest, to pay for charter flights into more remote subsistence use areas, or more easily make use of the road network through the purchase of a vehicle may have significant impacts on the pattern of subsistence harvest activity.
- **Socio-cultural issues**. The inter-relationship between the seasonality of the construction schedule and the Upper Tanana subsistence seasonal round is expected to have a major impact on subsistence harvest in some communities. Generally, through a network of wild food sharing among relatives and non-

[17] A report on Healy Lake subsistence (Braund & Associates 2002) completed as part of the Pogo Mine EIS has not been made available to NLUR due to EPA confidentiality restrictions. However, that report is summarized in the Pogo EIS (EPA 2003).

relatives, a small number of households provide subsistence resources to elderly residents and to many households who do not directly participate in the subsistence harvest. It will likely be the same middle-aged adults who are directly involved in the subsistence harvest that will be most able to undertake wage employment during gas pipeline construction. The seasonal pattern of movement of young and middle-aged adults out of the community to take wage employment, and then back to the community will have a major impact on the ability of the entire community to obtain seasonally available subsistence resources.

- **Health and nutrition**. Many villagers view subsistence as "a way of life" that nurtures and supports traditional Native values and self-identity. Alaska Natives often value wild foods as "country food" or "real food" as opposed to store-bought food. The inability of traditional Upper Tanana Native communities to obtain wild foods as a result of reduced harvest levels, from any cause, could result in increased health and social costs to the community.

SPECIFIC SUBSISTENCE ISSUES FOR UPPER TANANA COMMUNITIES

A survey of direct, indirect, and cumulative impacts specifically related to gas pipeline construction is discussed below for Upper Tanana communities. Subsistence issues were identified through review of the subsistence literature for the six communities between Delta and the Canadian border.

Potential gas pipeline impacts have been evaluated based on confidential information provided by the Sponsor Group. A more detailed discussion of impacts related to the placement of camps and facilities and the timing of construction activities is not included here due to the same confidentiality considerations.

The scope of this report did not include meetings or interviews with individuals who live in the Upper Tanana. Contemporary views of people who have first-hand knowledge must be at the core of detailed EIS preparation before construction of a gas pipeline. It is as important to understand the socio-cultural implications of gas pipeline development as it is to collect data about harvest and land use.

New road construction/improved access to subsistence use areas. An estimated total of 300 miles of new access road will be constructed as part of gas pipeline development. It is not known how many of those will be in Alaska. Information on the exact location of new roads is also not available, so no specific impacts on mapped resource use areas can be made at this time. However, it is reasonable to expect that the construction of new access roads and their impact on subsistence users will be greatest in the area from Delta Junction to the Canadian border, rather than in the TAPS corridor where existing access roads are available. In the Upper Tanana area, the following general impacts can be expected:

Direct impacts. Improved access to subsistence areas in the immediate vicinity of new roads may both increase pressure on the resources and increase the level of competition between local and non-locals for those resources.

Indirect impacts. Dust from road traffic could coat berries and plants in the vicinity of the road reducing the desirability of harvesting certain plant species adjacent to new gravel roads. Dust coated vegetation may cause some animals to move away from areas they formerly occupied.

Cumulative impacts. Increased pressure over time on subsistence resources in the vicinity of new roads could eventually lead to over harvest of those resources, or in the case of large mammals, possibly result in a movement of animals out of the area near the road.

Recommended programs, projects and mitigation activities

- Minimize new road construction to the extent possible
- Avoid new road construction in high value subsistence harvest use areas
- Restrict public access to construction roads through use of locked gates/barriers
- Ditch or water bar roads after construction to prevent continued public use
- Initiate dust control measures in critical habitat areas during construction
- Funding of community subsistence research to identify critical resource areas prior to road construction
- Purchase and installation of restricted access road signs
- Purchase and installation of gates / barriers to limit public access
- Cost of dust control measurers
- Employment of security personnel to enforce restricted access during and after construction
- Employment of personnel at Tanana Chiefs Conference to coordinate community meetings, interviews, and research

Increase in heavy truck highway traffic. Highways that parallel the gas pipeline will experience heavy construction hauling activity. It is expected that pipe hauling will be heaviest around Fairbanks. The Alaska Highway between Delta Junction and the Canadian border is expected to experience very heavy truck traffic over the multi-year gas pipeline construction period. The Alaska Highway and other area highways and roads in the Upper Tanana region are used by subsistence harvesters to scout for large game, hunt game birds, and access plant and firewood gathering locations adjacent to the road system.

Direct impacts: Heavy truck traffic over the gas pipeline construction period will likely discourage or prevent use of the Alaska Highway for subsistence related purposes for at least three years. Although most of the actual construction activity will be limited to the winter it is anticipated that movement and pre-positioning of equipment and supplies over the Alaska Highway to construction camps and the ROW will continue through the summer and early fall when hunting and gathering activities are taking place. Some trap line routes that parallel the Alaska Highway will likely be relocated during the construction period.

Indirect impacts. A shift of subsistence activities away from the Alaska Highway will likely increase harvest pressure on subsistence resources along other roads in the area such as the Taylor Highway where gas pipeline construction traffic will be absent. Trap line conflicts may arise as some trappers relocate their lines away from the Alaska Highway to other areas.

Cumulative impacts. Long term cumulative impacts on subsistence activities or harvest beyond the construction periods are expected to be minimal.

Bridge upgrades. In Alaska, as many as thirteen bridges, underpasses or overpasses will need to be upgraded so as to handle the high volume of heavy truck traffic that is anticipated from construction activities. One major bridge upgrade over the Robertson River (between Dot Lake and Tanacross) and five minor upgrades to other bridges are planned for the Alaska Highway south of Delta.

Direct impacts. Bridge construction or upgrade work has the potential to result in increased siltation or in toxic spills from construction equipment that could affect the health of fish populations downstream. Increased localized riverbank erosion from construction activity is also a possible direct impact from bridge work.

Indirect impacts. Subsistence harvest of fish in the Tanana River and tributary streams downstream from the Robertson River or other bridge construction locations could be impacted should a toxic spill occur. Subsistence-based communities of Dot Lake and Healy Lake Village are both located downstream from the Robertson River where major bridge construction work is planned. Restricted ability to travel up the Robertson River or other tributaries of the Tanana River for subsistence harvest purposes during bridge construction work could limit access to subsistence harvest areas.

Cumulative impacts. No cumulative impacts resulting from bridge construction activity is foreseen unless a major toxic spill were to occur that might have long term affects on the health of fish populations downstream from the spill site.

Recommended programs, projects and mitigation activities

- If possible, during bridge construction boat traffic should be permitted to pass through construction areas (given safety considerations).
- Spill response equipment should be on hand and trained personnel available on site to deal with toxic spills during bridge construction.
- Erosion control measures should be undertaken if bank erosion becomes a problem.
- Settling ponds and other silt control measures should be used to minimize increased siltation from construction activity.
- Toxic spill response capability should be a normal environmental consideration in bridge construction work and no spill response costs specifically related to subsistence impacts are identified.
- Costs of water quality monitoring downstream from bridge construction sites

Construction camps, compressor stations, and other facilities. Logistical support for gas pipeline construction will likely include construction camps, warehousing, roads,

airstrips, pipe lay down yards, pipe coating facilities, etc. Information on the location, size and duration of operation of camps is not available for release, nor is the planned location of compressor stations and other facilities. Construction camps operated for spreads adjacent to the existing oil pipeline may reuse historic sites originally constructed for TAPS. New camp sites will need to be developed for construction of the line from Delta to the Canadian border. It may be expected that existing commercial space will be used where possible to minimize environmental impacts at the possible trade-off of increasing social impacts.

Direct impacts. Specific impacts from gas pipeline construction or operations on subsistence harvest areas cannot be discussed without divulging confidential information on the locations of anticipated camps, compressor stations and other facilities.

Cumulative impacts. Long-term cumulative impacts as a result of camps, etc., beyond the construction period, are considered minimal.

Recommended programs, projects and mitigation activities

- Planned use of commercial property for construction camp locations will help minimize subsistence impacts and should be implemented.
- Subsistence studies targeting proposed camp locations are needed to better evaluate specific impacts to subsistence activities and harvest.
- Restrictions on fishing and hunting for gas pipeline employees while working on the gas pipeline would help minimize competition between area residents and non-locals for subsistence resources.
- Chemical, liquid, and solid waste from gas pipeline camps should be transported out of the immediate camp area to appropriate urban disposal facilities.
- Project specific subsistence studies for areas that will be directly and indirectly impacted by construction camps, compressor stations, equipment staging areas, or other facilities should be funded and completed prior to a final decision on the placement of those facilities.
- Funding to local communities for enforcement of gas pipeline employee fishing and hunting restrictions (this would likely be combined with other enforcement responsibilities, such as restricted road access).

Socio-cultural impacts. Economic, social and cultural impacts of gas pipeline construction on small subsistence-based communities along the corridor are expected to be extensive and to include many of the same impacts to community infrastructure as were experienced during past major economic boom periods in Alaska. Impacts on schools, social services, health care facilities, police and emergency services, crime rates, divorce rates, drug and alcohol use, etc. have been well documented for Fairbanks during TAPS construction (Dixon 1978), and to some extent for some of the smaller communities such as Valdez. It is difficult to forecast how these kinds of impacts might indirectly relate to subsistence activities.

Direct impacts. The most direct economic impact of gas pipeline construction on subsistence activities is the increased opportunity for wage employment outside the community on the gas pipeline or related induced employment. Gas pipeline wage employment will shift the available village workforce away from a focus on subsistence harvest activities to jobs located away from the community.

The inter-relationship between the planned seasonal construction cycle (that varies for the three Alaskan construction spreads) and the traditional Upper Tanana seasonal subsistence round will have a major impact on the ability of small subsistence-based communities to harvest wild foods. The young and middle-aged adult population that is most likely to pursue wage employment away from the community is the same age group most directly involved in the harvest of certain critical subsistence resources (moose, caribou, etc.) and through the distribution network makes those harvested resources available to the rest of the community. The seasonal loss of a few critical individuals in a small community to wage employment away from the community could drastically reduce the ability of the community to harvest seasonally available wild foods.

Among the Upper Tanana communities reported on here, the communities of Healy Lake Village, Dot Lake Village, Tanacross, Tetlin, and Northway Village likely would be most impacted by the absence of individuals directly involved in subsistence harvest activities from the community during periods of construction activity. The annual harvest in these and other larger communities would likely be drastically reduced during construction years. For specific Upper Tanana subsistence resources for which the proposed gas pipeline construction schedule may result in a reduced harvest, depending on the construction schedule, see the final table at the end of this section.

Indirect impacts. The extensive sharing of wild foods within a community and between communities by what is often relative few individuals and households to a wider network of friends and relatives results in the distribution of wild foods throughout the community and even the region. Often local resources are exchanged for wild foods not locally obtainable (as in the case of Copper River Salmon). Movement of persons who have the knowledge, ability, and equipment to harvest subsistence resources out of a community during periods of construction will reduce the wild foods available within the entire community and impact the regional distribution and exchange network so that individuals and households not directly involved in subsistence harvest but still dependent on wild foods may partially or completely loose access to some subsistence resources over the construction period.

Cumulative impacts. Possible long-term, post-construction cumulative impacts on subsistence in Upper Tanana communities may include some or all of the following:

- Increase in area population resulting in increased competition for subsistence resources.
- Depletion of some subsistence resources due to over harvest from population pressure.
- Loss of some trading and exchange relationships between households and communities.

- Permanent movement away from subsistence-based communities to wage jobs in larger communities by some individuals or households directly involved in harvest activities.
- Increased cash flow into communities used for purchase of equipment and supplies that increase ability of individuals and households to harvest wild foods.
- Increase in cash flow into communities that disrupts the social fabric of the community through increased drug and alcohol use, adverse impacts on community health and nutrition (possibly from greater reliance on processed foods), higher incident of divorces or suicides, and other social impacts that may reduce the ability of the community to harvest subsistence resources.
- If communities along the gas pipeline corridor eventually begin to use natural gas as an energy source, dependence on firewood will likely be greatly reduced and the large annual effort to gather firewood may be directed to other subsistence or non-subsistence relative activities.
- Provide funding to coordinate village meetings, interviews and research.

Recommended programs, projects and mitigation activities

- Encourage an employment policy that makes allowances for Alaska subsistence resource users from small subsistence-based communities to take time off work to harvest critical resources (like moose, caribou, or salmon) that are only seasonally available and extremely important to the community.
- Provide infrastructure support to communities along the gas pipeline route to respond to socio-economic, health, law-enforcement, and other areas of community impact directly related to gas pipeline construction and that may also be indirectly related to the ability of the community to participate in a subsistence-based lifestyle.
- Upgrading of community health clinics and subsidizing additional staff during construction years.
- Upgrading of community tribal offices and subsidizing additional staff, including Village Public Safety Officers, during construction years. (Note: Village Public Safety Officers could be used to enforce gas pipeline restrictions on use of access roads or restrictions on employee hunting and fishing activity while working out of gas pipeline camps.)
- Hiring of a community liaison person to advise pipeline management regarding socio-economic and cultural impacts of gas pipeline construction that need attention.
- Funding of drug and alcohol education and treatment programs in villages.
- Funding of tribal “Culture Camps” to foster the exchange of traditional knowledge and subsistence skills between generations.

Management/regulatory issues. Public input during the early planning phase of the gas pipeline project is an important and necessary pre-construction part of the project and the

early identification of subsistence related issues and concerns can lead to a reduced impact to subsistence harvest activities during the construction and operating phases.

Regulatory and management issues were the most frequently mentioned concerns expressed in the subsistence literature reviewed for the six Upper Tanana and other communities (See Figure 29). Small subsistence-based communities often do not have the resources or tribal staff capability to travel to Fish and Game board meetings to testify on behalf of the community, or to attend meetings or conferences where subsistence issues are discussed. Small communities and local or even regional tribal organizations often do not have the financial resources or staff to review and comment on subsistence sections of draft EIS or EIA documents prepared prior to implementing development projects such as the gas pipeline. Early public input into the gas pipeline planning process, especially from small subsistence-based communities whose ability to harvest traditional subsistence resources may be directly or indirectly affected by gas pipeline construction is essential to identify and mitigate potential impacts.

Recommended programs, projects and mitigation activities

- Assist communities and tribal offices to participate in the public input process by increasing the ability of private individuals and community or tribal representatives to attend ADFG board meetings and other meetings and conferences related to subsistence issues.
- Increase the ability of small communities and Native organizations to review and comment on EIS and EIA documents and other agency reports and documents upon which federal and state government regulatory decisions are made relating to subsistence and the permitting of development projects.
- Subsidize travel and per diem costs for community and tribal representatives to attend and/or testify at meetings and conferences related to subsistence issues.
- Provide funding to village or regional Native tribal organizations to expand the ability of those organizations to review and comment on government planning documents that address subsistence issues and impacts.
- Provide funding to coordinate village meetings, interviews and research. This could include personnel to deal with subsistence issues as well as cultural resources concerns (e.g., archaeology, history, ethnohistory, sacred sites, traditional cultural places).

SEASONAL HARVEST IMPACT

The extent and nature of impacts on subsistence and cultural activities will depend largely on the timing of construction phases over the multi-year project and the degree to which training and local hire make high wage jobs available to subsistence users. As stated earlier, the movement of persons who have the knowledge, ability, and equipment to harvest subsistence resources out of the community during periods of construction will reduce the wild foods available within the entire community and impact the regional distribution and exchange network.

The figures on the following pages showing the seasonal round of subsistence harvest for selected villages and regions can be used to judge how harvest of specific resources could be disrupted depending on the construction schedule. Although the exact construction schedule will vary by spread, it is expected that the greatest impact in all spreads will be on species and other subsistence resources primarily harvested in winter. For North Slope and northern Interior areas, where the ground freezes early and thaws late, the timing of subsistence impacts may start as early as October and continue through March or April. Some subsistence harvest impacts are also expected during shorter periods of summer and early fall construction activity. (A map of subsistence harvest areas for communities within the TAPS corridor appears in Appendix D.)

Occasional Periods of Harvest or Minimal Use Primary Periods of Harvest

Species	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Whale												
Seal / Ugruk												
Walrus												
Polar Bear												
Birds / eggs												
Caribou												
Moose												
Grizzly Bear												
Furbearers / trap												
Small mammals												
Sheep												
Fresh-water fish												
Berries / plants												

Source: North Slope Borough (1979: Figure 6)

Table 32: Subsistence harvest seasonal round, Anaktuvuk Pass

Species	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Whale												
Seal / Ugruk												
Walrus												
Polar Bear												
Birds / eggs												
Invertebrates												
Caribou												
Moose												
Grizzly Bear												
Furbearers / trap												
Small mammals												
Fresh-water fish												
Ocean fish												
Berries / plants												

Source: North Slope Borough (1979: Figure 1)

Table 33: Subsistence harvest seasonal round, Barrow

Occasional Periods of Harvest or Minimal Use Primary Periods of Harvest

Species	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Whale												
Seal / Ugruk												
Polar Bear												
Birds / eggs												
Caribou												
Moose												
Grizzly Bear												
Furbearers / trap												
Small mammals												
Sheep												
Fresh-water fish												
Ocean fish												

Source: North Slope Borough (1979: Figure 4)

Table 34: Subsistence harvest seasonal round, Kaktovik

Species	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Whale												
Seal / Ugruk												
Walrus												
Polar Bear												
Birds / eggs												
Caribou												
Moose												
Grizzly Bear												
Furbearers / trap												
Small mammals												
Fresh-water fish												
Berries / plants												

Source: North Slope Borough (1979: Figure 8)

Table 35: Subsistence harvest seasonal round, Nuiqsut

Occasional Periods of Harvest or Minimal Use Primary Periods of Harvest

Species	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Caribou												
Moose												
Bear												
Sheep												
Furbearers												
Waterfowl												
Ptarmigan												
River Fishing												
Lake Fishing												
Berry Picking												
Wood Cutting												
Wage Labor												

Source: Nelson ,Figure 2, In: Kotani and Workman (1980)

Table 36: Generalized subsistence harvest seasonal round, Interior Alaska

Species	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Whitefish												
Northern Pike												
Arctic Grayling												
Burbot												
Longnose Sucker												
Moose												
Caribou												
Dall Sheep												
Hare												
Muskrat												
Beaver												
Porcupine												
Marten												
Mink												
Wolverine												
Lynx												
Red Fox												
Wolf												
Squirrel												
Land Otter												
Waterfowl												
Ptarmigan (sp.)												
Berries (sp.)												
Firewood												
Other Plants												

Source: Northern Land Use Research, Inc., 2004

Table 37: Generalized subsistence harvest seasonal round, Upper Tanana villages

Subsistence Seasonal Harvest Impact. The following table shows the estimated seasonal harvest impact for each subsistence resource in the Upper Tanana region for a single year of gas pipeline construction. The impact was projected using confidential construction schedules provided by the Sponsor Group. Northern Land Use Research calculated the number of months that construction activity is expected to overlap with periods of primary and occasional harvest for each subsistence resource in six Upper Tanana communities. Seasonal harvest impacts in other construction years are expected to be both lighter and heavier than those shown for this sample year.

Species	Primary Harvest Months			Occasional Harvest Months		
	Overlap	Non-Overlap	Percent overlap	Overlap	Non-Overlap	Percent overlap
Whitefish	3	0	100	0	0	0
Northern Pike	1	2	33	2	0	100
Arctic Grayling	2	0	100	1	0	100
Burbot	2	0	100	1	0	100
Sucker	1	0	100	1	0	100
Moose	1	2	33	6	3	66
Caribou	0	2	0	2	2	50
Dall Sheep	1	1	50	0	0	0
Hare	7	5	58	0	0	0
Muskrat	2	1	66	0	1	0
Beaver	2	1	66	0	1	0
Porcupine	1	2	33	2	1	66
Marten	1	2	33	2	1	66
Mink	1	2	33	2	1	66
Wolverine	1	2	33	2	1	66
Lynx	1	2	33	2	1	66
Red Fox	1	2	33	2	1	66
Wolf	1	2	33	2	1	66
Squirrel	2	1	66	0	0	0
Land Otter	3	0	100	0	0	0
Waterfowl	1	2	33	0	1	0
Ptarmigan	4	0	100	3	5	38
Berries	1	1	50	2	0	100
Firewood	2	3	40	5	2	71
Other Plants	4	0	100	3	5	38

Source: Marcotte 1991: Figure 4; Information Insights, Inc.

Table 38: Sample Upper Tanana subsistence seasonal harvest impacts

IX. Cumulative North Slope Impacts

The North Slope Borough encompasses the entire northern coast of Alaska (north of the Brooks Range), about 90,000 square miles of terrain and roughly 15 percent of the land area within Alaska. The gravity of cumulative impacts on the North Slope comes to the forefront when assessing the footprint that the oil and gas industry has left upon this unique socio-economic region over the last sixty years.

The National Environmental Policy Act (NEPA) defines "cumulative impact" (according to 40 CFR 1508.7 and 1508.25[a][2]):

> The impact on the environment that results from the incremental impact of the action when added to the other past, present and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Not only do cumulative impacts result from independently small events, they also result collectively from major activities taken over time.

Along the proposed gas pipeline corridor, many areas will experience significant impacts during and after construction of the gas pipeline. However, the regions along the Alaska Highway have been experiencing developments associated with access to the road system since the 1940s. The extreme changes that accompany initial access to a road infrastructure have occurred in the past thirty years in the area along and adjacent to the Dalton Highway. Many of the effects of opening this vast area of Alaska to road traffic and industrial activity have been recorded individually.

Alaska's oil represents about one-sixth of total domestic oil production, with slightly less than half of that production coming from Prudhoe Bay, followed by Kuparuk and the Alpine Project near Nuiqsut. Oil and gas activities on the North Slope have left visual, economic, environmental, and cultural impacts that arguably have surpassed – at least in terms of rapidity of development – the recent industrial impacts on any other region of the state.

Cumulative impacts of oil and gas activities on the North Slope to date have been visual, economic, environmental, and cultural. As development infrastructure increased, individual enclaves gradually became an industrial community connected by a transportation system. When the complete EIS for the gas pipeline project is prepared, a comparison of prior predicted versus actual events – particularly in respect to predictions of subsistence and socio-cultural impacts – should help inform decision-making about this project.

In the North Slope Borough, exploration for and development of new natural gas reserves will accumulate impacts over time across a vast area. New developments are likely to have even more impact on subsistence and culture of the North Slope than the more time- and area-limited activities resulting from gas pipeline construction. The cumulative impacts that occur following construction and operation of the gas pipeline system will be most pronounced on the North Slope.

The network of developed fields and interconnecting roads, pads, pipelines and power lines has grown incrementally over the past 30 years with new exploration and the development of new fields. The proposed addition of a gas pipeline and treatment plant to

the existing complex of industrial infrastructure on the North Slope will expand the industrial footprint in the region, will increase demands for energy, water, gravel, and waste disposal, and will increase the volume of pollutants from industrial operations, vehicle emissions, and hazardous wastes. Exploration for additional North Slope gas reserves will add to the known effects of seismic surveying and drilling activities and, where successful, will further compound the impacts on North Slope environment and culture from the development and production of new fields and feeder pipelines. As oil and gas activities expand, the risk of a major spill increases.

As it is not an environmental impact statement, the current study will summarize rather than detail the environmental concerns inherent in the development of a gas pipeline, gas treatment plant, and upstream facilities. The focus here is on describing cumulative impacts of oil and gas activities – to which the proposed project could be expected to contribute – rather than analyzing environmental consequences of specific technologies and logistics of the Sponsor Group's project.

The importance of assessing the cumulative effects of successive independent development projects has been understood since at least the 1970s. When numerous small decisions about related environmental issues are made independently, the combined consequences of those decisions are not considered. As a result, patterns of environmental change over large areas and long periods can escape analysis. This has been the case on the North Slope until recently.

The North Slope Borough has played a central role in addressing this difficult issue, including assistance with the first comprehensive analysis of cumulative environmental effects of oil and gas activities in the region. In response to a 1999 request by the U.S. Congress, the National Research Council (NRC)[18] formed a committee of scientists and social scientists to produce the integrated report, which was published by the National Academy of Sciences in 2003; this summary relies heavily upon it.

Cumulative Environmental Effects of Oil and Gas Activities on Alaska's North Slope joins several other recent projects in examining changes in the natural environment through both hard science and a close examination of historical Alaska Native knowledge. Change that occurs in the remote Arctic in both culture and nature are of interest to scientists throughout the world. There has not always been, however, a consistent effort for a high quality cumulative impact assessment in the Environmental Impact Statements of projects planned for the northern regions of Alaska.

The term spaghetti effect has been used to describe the upstream industrial sprawl that is of particular concern in the North Slope Borough. As industry expands westward toward the Colville River delta, and into NPR-A, more roads and industrial developments spot the landscape, creating islands of land surrounded by industrial activity. These areas may have been utilized for subsistence harvest but have become unavailable even though they are not technically part of any project. Hunters have been excluded from traditional hunting areas; where they are not explicitly excluded they tend to avoid areas of

[18] The National Research Council is part of the National Academies, which also comprise the National Academy of Sciences, National Academy of Engineering and Institute of Medicine. They are private, nonprofit institutions that provide science, technology and health policy advice under a congressional charter.

development for hunting purposes. Expansion of field development has to be considered as a direct extension of permitting the pipeline – *upstream* development is a critical component of assessing the true impacts on the North Slope Borough.

The following series of maps illustrates the spread of oil and gas infrastructure in the North Slope from 1977 through 2001.

Figure 30: Extent of North Slope oil development, 1977

Figure 31: Extent of North Slope oil development, 1989

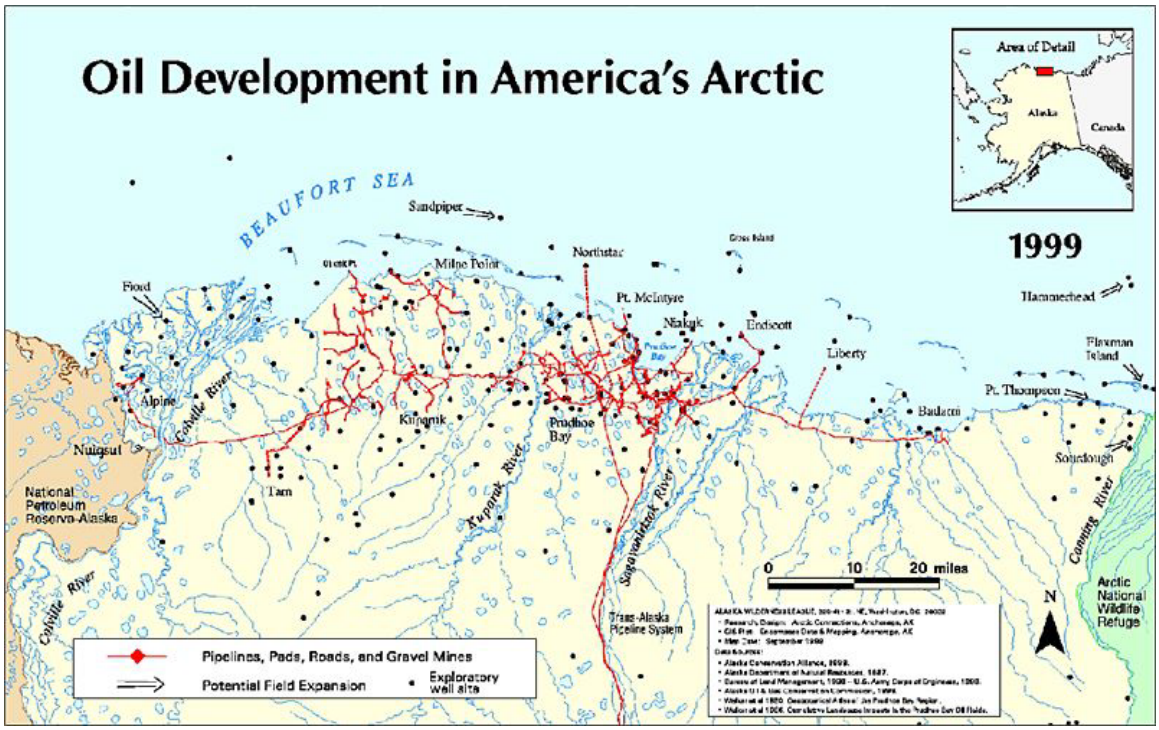
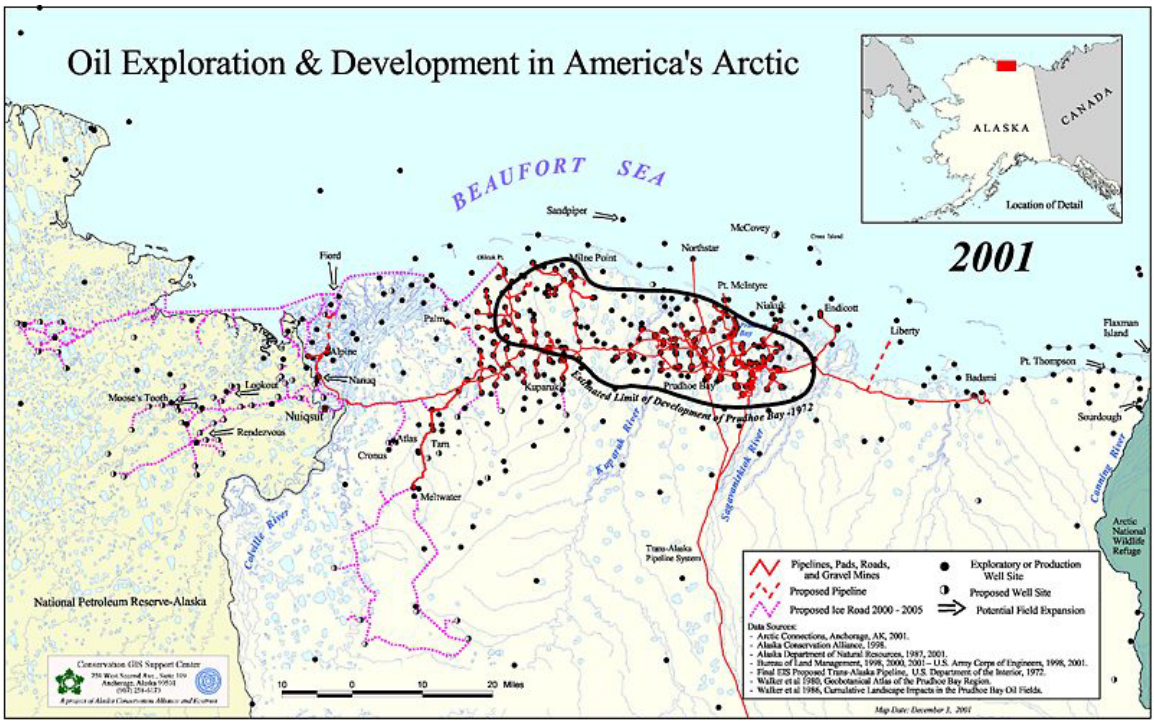


Figure 32: Extent of North Slope oil development, 1999



Maps reprinted by permission of Ecotrust, www.ecotrust.org.

Figure 33: Extent of North Slope oil development, 2001

In the final map, the thick black line circling the original development area near Prudhoe Bay shows the limit of development as estimated in 1972. By 2001, actual development had spread far beyond what was originally envisioned. The dashed purple line shows ice roads proposed for 2000-05.

Due to the nature of a modern economy it is necessary for people to have regular cash jobs. Oil and gas industry jobs are structured in a way that tends to make them incompatible with many traditional and cultural activities, including subsistence activities and maintaining close ties with extended family.

Many of the effects felt by Alaska Native people who are residents of the North Slope Borough have resulted incrementally from many projects. A letter from Mayor George Ahmaogak Sr., in response to the Alpine Satellite Development Plan EIS asserts that most state and federal regulatory agencies have failed to address the more macro impacts in a meaningful way, instead focusing on the causal effects of an individual project. Ahmaogak goes on to say that the North Slope Borough has argued for years the need for a more consultative approach that includes local stakeholder input as a critical component to finding a solution to the cumulative impacts issue.

There is a wide array of impacts for which finding a dollar value is next to impossible. Measuring the value of a culture is certainly not within the scope of this project. However, a multitude of projects are being planned and developed throughout Alaska, including within the North Slope Borough. They create real and substantial cumulative impacts on both the natural world and the cultures of Native people.

In addition to industrial activity, the North Slope has seen greater non-resident hunter activity resulting from increased accessibility via the Dalton Highway. Reducing the supply of land available for subsistence activities and increasing access to previously remote land has the additional unintended effect of altering the way in which people think about land. Decreases in the amounts of available land may cause an emphasis on enforcing property borders, even though this has not been a traditional land use pattern in most Alaska Native communities.

The concept of examining cumulative effects should include interaction between the impacts of former military activities, new gas pipeline activities, and subsistence resources and activities. In the Upper Tanana, military pipelines carried products northward from Whitehorse (CANOL) and Haines (Haines-Fairbanks pipeline). A suite of issues has emerged from those pipelines and should be integral to discussions with knowledgeable people in the region as part of the EIS process. In the Upper Tanana, as in other regions, there are additional on-going questions about hazardous waste liabilities remaining from past military activities; trespassing on Native allotments; rights-of-way; and gravel sales.

According to a 1986 NRC report, *Ecological Knowledge and Environmental Problem-Solving*, the accumulation of effects can result from a variety of processes, including time crowding, space crowding, compounding effects (synergistic interactions of multiple sources on a single environment), thresholds (effects that become qualitatively different once some threshold of disturbance is reached), and nibbling (the progressive loss of habitat resulting from a sequence of activities). Among the accumulated effects of oil and gas activities on the North Slope found by the NRC's committee of experts were:

Visual effects. All roads, pads, pipelines and other infrastructure are still in place and likely to remain for some time. Visual effects will accumulate with expanded activity and persist as long as structures remain, even if industrial activity ceases.

Economic and political effects. The discovery of oil at Prudhoe Bay was the catalyst for many changes that affected the human environment in the North Slope. The passage of the Alaska Native Claims Settlement Act in 1971 and the incorporation of the Arctic Slope Regional Corporation, village corporations, and the North Slope Borough in 1972 all transformed economic and political life in the region in ways and to a degree that would not have been possible without the discovery and development of North Slope oil.

The formation of a local government, after successfully countering legal challenges from both the state and industry, gave the North Slope Borough to power to tax oil and gas facilities. Revenues from oil and gas property taxes have allowed the borough to greatly expand services, including education, water and sewer, electrical power, health care, housing, transportation infrastructure, and police and fire protection. With the expansion of services and an ambitious capital improvement campaign, government has become the dominant employer in the region. Together, the borough government, the school district, Ilisagvik College, capital improvement projects, and city, state and federal governments employ 61 percent of the region's workforce. By contrast, residents of the state's "Northern Regions" (Nome, North Slope Borough, Northwest Arctic Borough) remain underrepresented in the oil and gas industry, making up less than one percent of the labor force in a 2001 Alaska DOLWD survey of companies that collected data on residency.

The availability of well-paid jobs has fueled demand for local goods and services, and has had a significant effect on the social structure of North Slope communities as they changed from subsistence-based economy to a mixed subsistence-cash economy.

Economic and political adjustments will again be necessary when oil and gas activities cease. The continuation of current life-styles will be impossible unless new sources of outside revenue are found. However, it is most likely that sources of funding that replace oil and gas revenues will be modest, and painful adjustments will be required. The extent and nature of the adjustments will depend in part on how North Slope communities are able to adapt the cash economy made possible by oil and gas exploration and development.

Human health and social effects. It is not possible to say to what extent social and health problems in the North Slope are attributable to oil and gas activities. Diabetes, circulatory disease, obesity, alcoholism and drug addiction have all increased over the period that oil and gas development—and with it increased assimilation into modern Western culture—have come to the Arctic. Development of the region's resources have allowed the North Slope communities to build better schools and clinics, provide better communication, and benefit from better access to more professional local health care.

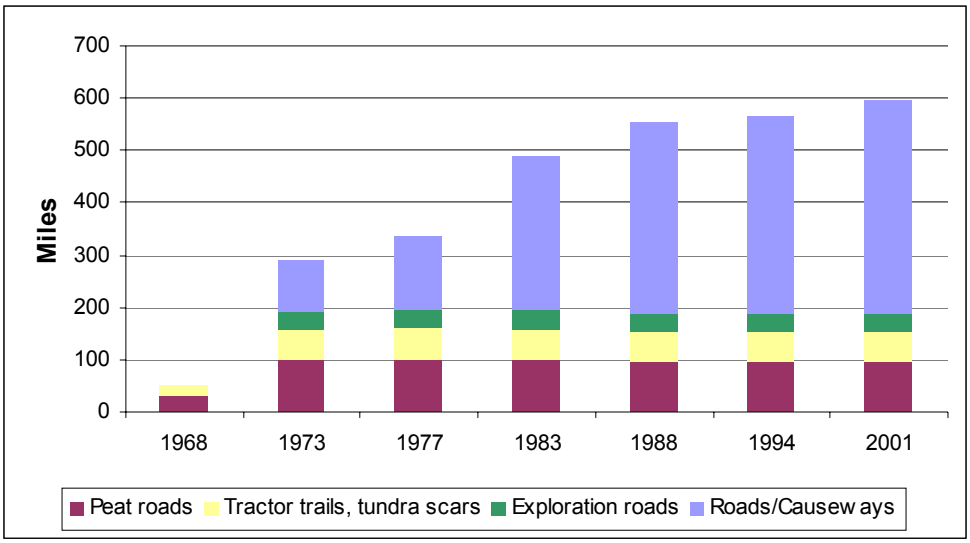
Damage to tundra. Networks of seismic trails and other off-road vehicle trails, ice roads and ice pads that cover large areas of the tundra can damage the vegetation and can be seen from the air. The tundra is vulnerable to disturbance of the organic mat and to the underlying permafrost. The federal and state governments at times when the ground is frozen to an average depth of twelve inches and when snow depth averages six inches restrict off-road seismic surveys. New technologies may minimize the damage by reducing the weight, tracks and number of vehicles used in seismic exploration. However, the effects of these technologies have note been extensively studied. If warming trends continue in the Arctic, it will be hard to predict the consequences of off-road travel on the tundra in winter. From 1990-2001, 15,499 miles of seismic lines were surveyed in northern Alaska.

Roads. In addition to their direct effects on the tundra, roads built for oil and gas exploration and development have many indirect effects, including those caused by dust, roadside flooding, roadside snow accumulation, and thermokarst (shallow pits and depressions caused by selective thawing of ground ice or permafrost). Roads can alter animal habitat and, if connected to outside areas, can result in increased competition for subsistence resources from hunters outside the region. Roads can also bring tourists, scientists and other visitors to the area who have contributed to the local economy. They have improved communication within the region and between North Slope residents and those outside the region.

An analysis of the cumulative impact of oil-field infrastructure in the North Slope has been done using a series of aerial photographs taken in 1968, 1973, 1988, and 2001. The length of roads and the area affected by roads, pads, gravel mines, and some other disturbances were estimated for four regions of the North Slope where most of the development has occurred.[19] From 49 miles of peat roads and tractor trails in 1968, the

[19] The major oil fields covered by the four areas are: the main Prudhoe Bay field, Lisburne, Niakuk, Endicott and several smaller fields; Kuparuk and Milne Point fields; the Badami oil field and a few remote

industry's road network grew to 596 miles of gravel roads and abandoned roads and trails in 2001, as shown in Table 39. Most of the expansion occurred during the development of the Prudhoe Bay and Kuparak oil fields before 1988, during which the rate of growth was about 24 miles per year. Since 1988, the rate of growth has been about 3.3 miles per year.



Source: National Research Council, 2003

Table 39: Growth in oil and gas infrastructure, 1968 to 2001

Gravel mining and redistribution. Most roads and other permanent facilities must be built on thick gravel pads to prevent thawing of the underlying permafrost. Gravel is also used for causeways and man-made islands for offshore activities. The gravel is obtained locally, primarily from riverbeds and gravel pits excavated into the tundra. Its removal and redistribution affect drainage patterns, flow volumes, melting and freezing of the active layer, movements of humans and animals, the visual landscape, and snow accumulation. Gravel also kills the vegetation it covers. From 1972 on, more than 73 million cubic yards of gravel was extracted from 24 open-pit mines affecting some 6,364 acres of stream and riverbeds and upland sites on the North Slope, according to estimates made by the Alaska Department of Natural Resources (ADNR) and the federal Minerals Management Service (MMS).

An analysis of aerial photographs shows that the total gravel-covered area in four major development areas of the North Slope increased from about 20 acres in 1968 to about 9,200 acres in 2001, as shown in Table 40. The rate of gravel placement declined noticeably after 1988, after the main road network and most of the pads for the major oil fields was in place. The average rate of growth in gravel coverage was 780 acres per year before 1988 and 57 acres per year since then. Most gravel-covered areas are associated

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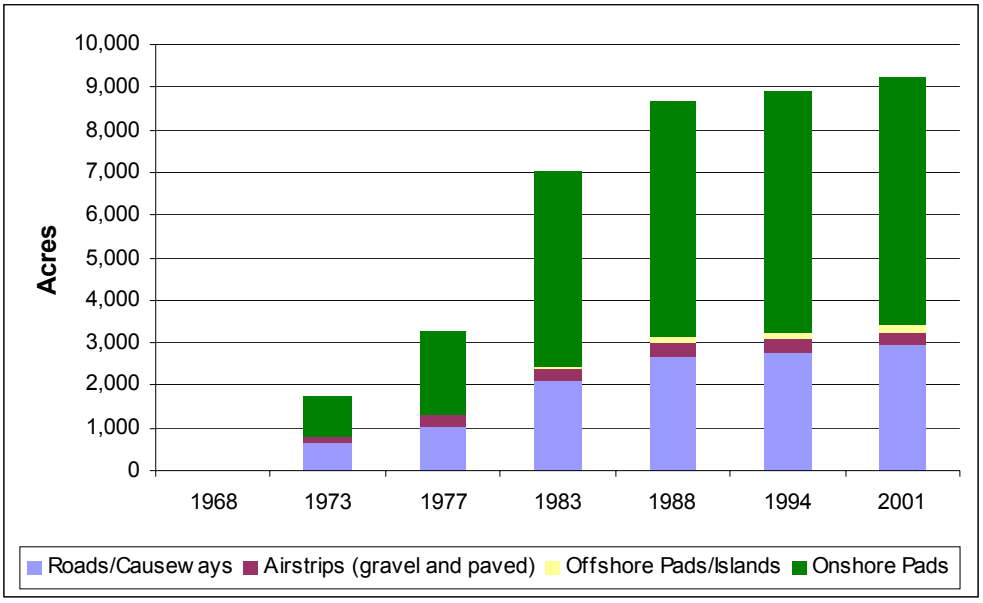
exploration sites; Meltwater, Tarn and Alpine fields. The analysis did not address areas indirectly affected, including seismic trails, ice roads, or off-road vehicle tracks. It did not include TAPS, the Dalton Highway, NPR-A, or other areas of the North Slope.

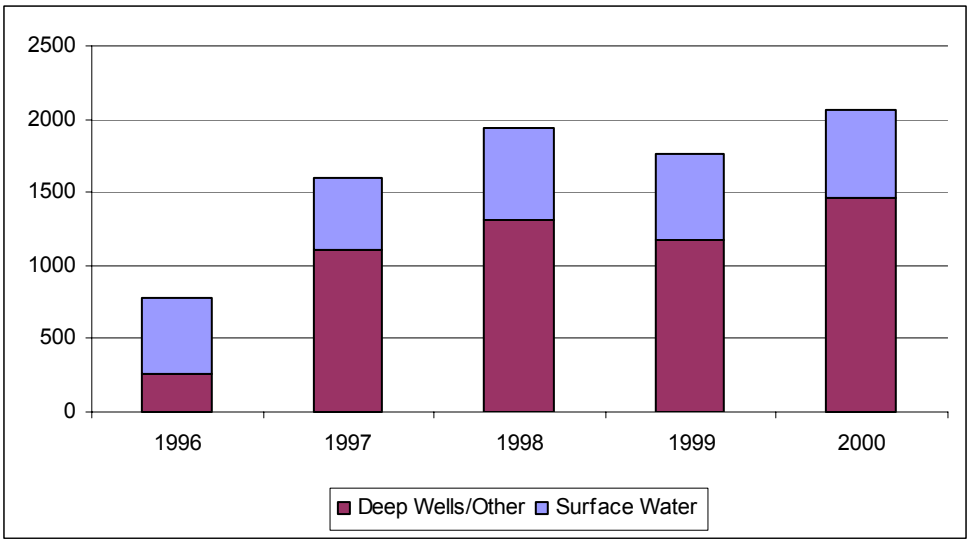
with onshore drilling and construction pads (5,777 acres in 2001). The rest is in roads and causeways (2,974 acres), airstrips (287 acres), and offshore gravel pads and islands (155 acres). Much of the initial development used technologies that are no longer in use and was done before adequate regulatory controls were in place to minimize adverse effects. Newer exploration technologies have reduced the overall use of gravel and come close to eliminating it from the exploration-drilling process.



Source: National Research Council, 2003

Table 40: Growth in gravel coverage, 1968-2001

Water withdrawal. Large amounts of fresh water are required for the construction of ice roads and pads and other uses. Overall, 1.5 billion gallons of water was used by North Slope oil and gas operations in 2000, according to ADNR estimates. The removal and redistribution of water can affect the organisms that depend on it for habitat, migration, food, and safety. Typically, water is taken from shallow lakes (less than 6 feet) that support few fish since they freeze to bottom in winter. As development spreads into regions with deeper lakes, there is a greater chance that fish populations will be affected. Current regulatory requirements allow 15 percent of the minimum winter water volume to be removed from fish-bearing lakes, although the NRC committee advised that this regulation needs more study.



Source: National Research Council, 2003.

Table 41: North Slope fresh water use in established fields (in millions of gallons)

Seawater use and sea ice structures. Large amounts of seawater are withdrawn from the Beaufort Sea and injected underground to maintain or enhance pressure in the geologic formations for oil recovery. Between 1996 and 2001, an average of 46 million gallons of seawater were removed per day. Exploration and development in nearshore and offshore waters of the Beaufort Sea require a variety of temporary and permanent structures, such as causeways, islands, and drilling platforms, plus additional coastal zone marine facilities and increased marine transportation. Longshore currents have been altered by coastal structures, such as causeways, and those alterations can affect migrations of fish and perhaps other animals. In the summer, onshore seawater spills kill vegetation. Gravel structures and grounded ice roads and islands can affect the stability and persistence of shore-fast ice when they serve as anchoring points or cause cracks and leads to form in the ice sheet.

Transportation. Air, ground, and marine transportation needs are substantial during the construction phase of oil and gas infrastructure development. The Northstar project required about 35,000 surface trips by bus, truck, and other vehicles. Transportation needs dropped dramatically after construction was complete.

Power generation, waste disposal, and pollution. Power generation and waste disposal continue throughout the life of an oil field. Power is generated by gas-fired turbines and heaters in the North Slope, while diesel engines power most exploratory equipment, trucks, buses, and heavy equipment. These facilities and vehicles emit substantial amounts of air pollutants. Nitrogen oxides (NO_x) constitute the largest single category of pollutants emitted, estimated at 70,000 metric tons per year. Estimates of annual carbon dioxide (CO_2) emissions from Prudhoe Bay facilities range from 7.3 million to more than 40 million metric tons. Methane emissions have been estimated at 24,000 metric tons. Other emissions from North Slope facilities include carbon monoxide (CO), sulfur dioxide (SO_2), particulate matter, and volatile organic compounds. In 1994-95, these were measured at 11,000 metric tons, 1,334 metric tons, 5,400 metric tons, and 2,400

metric tons respectively. In addition, airborne particles generated by construction activity and vehicle travel on gravel roads can significantly affect adjacent tundra.

More than 100,000 cubic yards of solid waste are generated by oil-field operations each year. North Slope industrial waste includes oil-contaminated wastes, spill-cleanup materials, batteries, scrap metal, paper and polystyrene waste, tires, construction debris, wrecked vehicles, insulation, old drilling rigs, and food and domestic waste. Wastes are recycled, disposed of in the Deadhorse landfill, or incinerated. The North Slope Borough received 97,000 cubic yards of waste in 2000.

Liquid wastes include sewage and domestic wastewater, desalination treatment discharges, and seawater-treatment plant discharges. Until recently, treated sewage and domestic wastewater typically were discharged to tundra ponds or to surface impoundments. Desalinated and seawater treatment wastewater are discharged to the ocean.

Other waste associated with oil-field exploration, development, and production includes waste from drilling operations (up to 300,000 gallons of waste muds and "cuttings" per well), produced water, typically containing a variety of organic pollutants and toxic metals (an average of 51.7 million gallons per day), which is usually reinjected, and "associated waste," including hydrostatic test fluid, oil and oily water, tank-bottom sludge, waste from well workovers and stimulations, pipeline pigging waste, and gas dehydration wastes. In addition, there are more than 9 metric tons of waste generated annually on the North Slope that qualifies as hazardous according to EPA rules, and which is shipped to disposal facilities in the continental United States.

Effects on animal populations. Animals have been affected by oil and gas activities on the North Slope. Bowhead whales have been displaced during their fall migrations (see below). Some denning polar bears have been disturbed. New sources of food from people in the oil fields have resulted in increased densities of predators, such as brown bears, arctic foxes, ravens, and glaucous gulls, which prey on eggs, nestlings, and fledglings of many bird species. Efforts to reduce amount of supplemental food available to predators have been only partially successful. The reproductive success of some bird species in developed parts of the oil fields has been reduced because of higher predator counts. In some species, high predation rates have reduced their reproductive success in industrial areas to the extent that reproduction has been insufficient to balance mortality in some years.

Subsistence and socio-cultural effects. Subsistence is more than the sum of harvest and resource procurement. In anthropological terms, it is "ideological, value-driven, and value-laden"—an idiom that defines self and community.

Native residents of the North Slope have a centuries-old nutritional and cultural relationship with the bowhead whale. It is the foundation of the socio-cultural system in six of the region's eight communities. Even for the others, who rely more directly on the ringed seal, fish and caribou, whale resources shared by relatives in whaling villages comprise an important subsistence resource. According to the NRC committee, bowhead whales are most likely to be affected by marine seismic exploration, exploratory drilling, ship and aircraft traffic, discharges into the water, dredging and island construction, and

production drilling. If two or more types of disturbance occur at the same time or in the same general area, the effects could be greater.

Industrial activities can disrupt bowhead migration routes. Fall-migrating whales avoid areas where noise from exploratory drilling and marine seismic exploration exceeds 117-135 dB, forcing hunters to travel farther to hunt bowheads and increasing the likelihood of exposure to adverse weather. Hunting further from home also increases the risk of carcasses deteriorating. Recent agreements to limit or move some industrial activities in the fall have reduced this impact on hunters.

Caribou hunting is the most important subsistence resource in two of region's eight communities and an important secondary resource in other communities. Industrial activities from oil and gas development have affected the distribution of this important subsistence resource and impacted local access and competition. Road traffic and other industrial obstacles and noise deflect caribou from traditional migratory routes. Herds have also been shown to avoid the glare caused by the reflecting coating on the pipeline.

Industrial sprawl has reduced the amount of land available for subsistence hunting and made access to some traditional hunting grounds more difficult. Security regulations further increase the amount of land off-limits to subsistence hunters beyond the actual footprint of development. Due to restrictions on using firearms within a 3-mile zone of the Alpine pipeline, residents of Nuiqsut must travel further to hunt caribou. According to Nuiqsut hunters, what was once a two to three mile trip has become a round trip of 10-15 miles. With rising fuel costs, the added distance has significantly increased the cost of procuring this subsistence resource.

More general changes in subsistence harvest and use patterns have been documented in the community of Wainwright (Kassam and Wainwright, 2001). In community surveys done over recent decades, Wainwright residents have noted the following subsistence-related changes:

- Less time available to pursue subsistence resources in an economy increasingly wage-dependent;
- Greater reliance on technologically sophisticated support for subsistence activities;
- More narrowly confined corridors in which terrestrial and river-based subsistence activities occur;
- Reduced diversity of species sought through subsistence (many former food species no longer used);
- Greater gaps between the "haves" and "have-nots" in a community where subsistence is practiced.
- Less traditional environmental knowledge transferred from one generation to the next.

Further discussion of subsistence impacts of oil and gas development is included in section VIII. Subsistence and Socio-cultural Impacts.

Aesthetic, cultural and spiritual values. Effects include compromised wilderness and scenic values over large areas, reduced opportunities for solitude, and the violation of what some Natives call the "spirit of the land," which is central to their relationship to the land. These consequences accumulate whenever new development expands the area affected by development, and will persist as long as landscapes remains altered.

Risk of major spills. Accidental spills of crude oil, petroleum products, and saline water (produced with oil or seawater used in enhanced recovery operations) have occurred on the North Slope. No large oil spills (more than 42,000 gallons) have occurred on land on the North Slope, although many smaller spills have. Three major spills have occurred from the North Slope segment of TAPS. No major offshore oil spills have been reported. Most crude oil, petroleum products, and saline water spills were confined to gravel pads and roads. Some have affected small areas of tundra, resulting in long-term damage. Spills can occur at and around exploration and production facilities.

The threat of a major spill accumulates with new exploration and development. Inupiat residents of the North Slope view the possibility of a major spill, especially in the Beaufort Sea, as a potential catastrophe. The threat to bowheads from a major offshore spill would constitute a threat to Inupiat cultural survival.

Exploration. When seismic surveys indicate that commercially feasible quantities of oil or gas are present, exploratory drilling is done. Offshore drilling is done in the winter from ice islands, artificial gravel islands, natural islands, drilling vessels or platforms. Onshore drilling is done in winter using ice roads (or ice airstrips in remove locations) and ice drilling pads. Subsistence impacts of offshore activities during fall bowhead migrations have already been mentioned. Exploratory drilling requires large amounts of water. A single well can use 1.5 million gallons. An additional 360,000 gallons are generally required for camp use. Water usage for ice roads is also intensive. Ice roads have become increasingly favored as less expensive and less damaging than gravel roads. The Bureau of Land Management estimates that 1 to 1.5 million gallons are needed per mile for an ice road that is 6 inches thick and 30 to 35-feet wide. For the 2001-2002 drilling season, the industry planned to use 260 miles of ice roads.

Once a gas pipeline and treatment plant are in place, continued gas exploration activities in the North Slope will occur in order to increase economic returns and extend the life of the project. Continued exploration and development will exacerbate some existing effects of oil and gas activities and generate new ones. Federal policy encourages offshore development while state lease sales have expanded into the North Slope Foothills. Upstream industrial sprawl will likely expand to include some combination of offshore and Foothills presence in much the same way that the original Prudhoe Bay infrastructure has spread.

New technologies. Newer exploration technologies have reduced the overall use of gravel and water, provided data for better siting of facilities, reduced the number of wells required to find and evaluate a new field, and reduced the size and number of pads required to develop a new field. Because new technologies use more effective drilling and fewer wells, the quantities of waste are smaller, and because fuel consumption is lower, emissions are fewer.

While new technologies reduce the environmental impacts of oil and gas activities, there is still potential for some amount of environmental damage. Gravel mining, tundra coverage, water use, the disposal of drilling mud and other wastes are expected to continue for the foreseeable future. The risk of spills is still inherent in oil and gas activities. In addition, changing climate conditions may reduce the usefulness of some newer technologies in some circumstances.

Climate change. Climate change has been unusually rapid in the Arctic over the last several decades. Future exploration and development may well occur in a climate that continues to warm, with milder winter temperatures and shorter periods of freezing. If warming trends continue, the human and natural environment will be affected in a variety of ways, and oil and gas producers may need to adapt technologies to the changing conditions. North Slope residents' reactions to climate change have been the subjects of general analysis (Wohlforth, 2004) and more rigorous scientific study (Norton, 2002).

According to the NRC 2003 report, continued warming may alter or affect:

- Extent and timing of sea ice;
- Existing infrastructure;
- Usefulness of oil and gas development technologies currently used in the Arctic;
- Distribution and abundance of marine and terrestrial plants and animals;
- Permafrost;
- Arctic ecosystems and Native cultures, and how these are affected by oil and gas activities;

Any of these factors may complicate analysis of observed changes and frustrate the ability to isolate causes for those changes (climate or oil and gas development).

The Arctic Council study being released in November 2004 is expected to add significantly to the body of climate change knowledge. This should make it requisite to align planning and development with Native knowledge and scientific understanding of how the nature and rate of change affects infrastructure development and subsistence resources.

Restoration. With the exception of procedures for well plugging and abandonment, state, federal and local agencies have largely been silent on the nature and extent of restoration that will be required. Because the obligation to restore sites is unclear and restoration is likely to be expensive, the NRC's committee on cumulative environmental impacts concluded that most disturbed habitat on the North Slope is unlikely to be restored unless these constraints change dramatically. Natural recovery in the Arctic is slow. For that reason, the effects caused by abandoned and unrestored structures are likely to persist for centuries. As new infrastructure is added in the region, the effects will accumulate further if restoration is not required. Comments related to the Kennecott-Copper River Railway history, included in the TAPS experience section, also apply here.

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Appendix A: Municipal Advisory Group Resolutions

RESOLUTION 2004-01: STRANDED GAS CONTRACT PROVISIONS

Whereas the intent of the Stranded Gas Development Act is to provide a mechanism for achieving the fiscal certainty that potential project sponsors indicate they need before proceeding with the large investment needed to bring Alaska North Slope natural gas to market;

Whereas the Stranded Gas Development Act allows the state to contract away municipalities' ability to collect property tax under AS 43.56, municipal sales and use tax, municipal special assessments, a comparable tax or levy imposed by the state or a municipality, or other state or municipal taxes or categories of taxes identified by the commissioner;

Whereas the Stranded Gas Development Act requires a Municipal Advisory Group be established to provide advice to the State of Alaska Department of Revenue;

Whereas the State of Alaska has received and accepted an application from a qualified sponsor group under the Stranded Gas Development Act, is considering other applications, and is reviewing other proposals for the development of Alaska North Slope Gas;

Whereas the Stranded Gas Development Act offers sponsors of stranded gas projects an opportunity to negotiate fiscal contracts with the State of Alaska, thereby potentially increasing the certainty for calculating taxes and royalties over the life of the project and thus increasing the competitiveness of the project and reducing fiscal risks;

Whereas under the Stranded Gas Development Act, the Commissioner of Revenue may negotiate terms for inclusion in a proposed contract with a qualified sponsor providing for periodic payment in lieu of one or more taxes that otherwise would be imposed by the state or a municipality;

Whereas the Stranded Gas Development Act requires a qualified sponsor to provide a detailed description of options to mitigate the increased demand for public services and other negative effects caused by the project;

Whereas the Stranded Gas Development Act requires applicants to provide a description of the methods and terms under which the applicant is prepared to make gas available to meet the reasonably foreseeable demand in the state for gas within the economic proximity of the project during the term of the proposed contract;

Whereas the State of Alaska has established a Municipal Advisory Group consisting of representatives of revenue-affected municipalities, economically-affected municipalities, and the unorganized borough;

Whereas the purpose of the Municipal Advisory Group is to make recommendations to the State on an acceptable revenue stream and structure to local governments in lieu of

taxes and for the commissioner to report periodically on the development of the contract provisions that affect the municipalities;

Whereas the Stranded Gas Development Act implies a payment in lieu of traditional municipal taxes may be needed to make a gasline project viable;

Whereas another purpose of the Municipal Advisory Group is to assist the State of Alaska in determining the social and economic impacts on municipalities of the construction and post-construction of an Alaska gasline project, and the attendant costs of those impacts to municipalities;

Whereas a fixed line-wide payment in lieu of taxes may not allow for changing conditions within a municipality or the state, such as those changes created by new voter approved bonds, increased mill rates, and formation of new local governments;

Whereas it is incumbent upon municipal officials to communicate clearly to residents about public revenues;

Whereas the Municipal Advisory Group desires the Alaska gasline project to maximize training and hiring of workers and contractors from within the state, leading to enhanced workforce and economic development;

Therefore be it resolved by the Municipal Advisory group that:

1. No reduction or deferral in municipal taxes is acceptable without appropriate justification from the State of Alaska and the project sponsor;
2. The State of Alaska should weigh the cost benefit of a tax exemption with the difficulty of administering an exemption from specific taxes;
3. The State of Alaska should devise a payment in lieu of taxes structure that provides certainty for municipalities at least through the end of the stated contract period;
4. The State of Alaska should ensure the payment in lieu of taxes structure recognizes the loss to present and future forms of local government of the opportunity to respond to changing conditions through changing tax rates;
5. The State of Alaska should provide incentives to the successful applicant under the Stranded Gas Development Act to ensure the training and hiring of Alaskans for the construction, operations and maintenance of the gas pipeline;
6. The State of Alaska should require that the successful applicant will include take-off points at strategic locations along the pipeline to make gas available to meet the reasonably foreseeable demand for in-state natural gas use;
7. The State of Alaska should ensure there will be a fair tariff to the points of in-state takeoff of gas;
8. The State of Alaska should ensure that affected municipalities' combined share of the economic rent of the approved project should correlate with the revenue stream of the project by negotiating that the present value of the aggregate amount of payment in lieu of taxes is not less than the amount that would have been collected under AS 43.56, AS 29.45 and 29.46.

RESOLUTION 2004-02: PARAMETERS FOR PAYMENT IN LIEU OF TAXES

A resolution outlining parameters for Payment in Lieu of Taxes to Municipalities:

A. Whereas the Stranded Gas Development Act anticipates a negotiated contract between the State of Alaska Department of Revenue and revenue impacted municipalities in lieu of traditional property taxes under AS 43.56;

B. Whereas the Municipal Advisory Group, established under the auspices of the SGDA, has met regularly to discuss and review issues relating to revenue and socio-economic impacts of a gasline on municipalities;

C. Whereas it is not the intent of the SGDA to exempt or modify property taxes currently being assessed and collected under 43.56 but to modify the shape of future property taxes to be assessed and collected for the Alaska Natural Gas Pipeline;

D. Whereas the definition of taxable property under 15 AAC 56.075 is confusing in terms of defining dual use property for purposes of taxation under 43.56;

E. Whereas "stranded gas" defined in AS 43.82.900 means gas that is not being marketed due to prevailing costs or price conditions, as determined by an economic analysis by the commissioner for a particular project;

F. Whereas real and personal property that is used or committed by contract or other agreement for use within this state primarily in the exploration for, production of, or pipeline transportation of gas or unrefined oil, or for the operations and maintenance of such facilities, is taxed under AS 43.56 rather than under AS 29.45;

G. Whereas an exception to the definition of taxable property under AS 43.56 is "for property used solely for the retail distribution or liquefaction of natural gas";

H. Whereas the Municipal Advisory Group has not come to agreement on the shape, length or allocation methodology of a Payment in Lieu of Taxes to revenue impacted communities;

I. Whereas the Municipal Advisory Group has come to consensus on the general parameters in which a PILT should be negotiated;

J. Whereas a number of factors argue against sales tax exemptions, including:

   a. Complexity of administering sales tax exemptions;

   b. Onus on vendors collecting sales taxes;

   c. Difficulties of determining who is an exempt entity;

   d. The determination of exempt items;

   e. Competitive advantage/disadvantage based on entities exempted;

   f. Cost/benefit of exemption – especially given per transaction caps;

   g. Cost of sales taxes not material to the project;

Be it therefore resolved that the Municipal Advisory Group recommends the following parameters be utilized in future PILT negotiations:

1. No property that is taxed under AS 29.45 or AS 43.56 prior to the start of construction of an Alaska Natural Gas Pipeline should receive a tax deferral/exemption under a SGDA contract;
2. A contract developed under the SGDA should clarify the conditions under which dual use facilities are to be taxed in order to protect municipalities' tax bases in existence prior to the start of construction;
3. No tax exemption under the SGDA should apply to a gas pipeline or gas distribution infrastructure in existence prior to the start of construction of an Alaska Natural Gas Pipeline.
4. No tax exemption under the SGDA for municipal sales and use taxes.
5. SGDA contract may include provisions to ensure sales taxes are not targeted to gas pipeline construction and operations.
6. No exemption under SGDA contract for the Alaska Natural Gas Pipeline for property that under current tax law would be taxable under AS 29.45.
7. SGDA contract may include provisions to ensure municipal severance taxes are not targeted to gas pipeline construction.

RESOLUTION 2004-03: IN-STATE USE

A resolution advising the State of Alaska to reinforce the requirements of the Stranded Gas Development Act to make natural gas available to meet in-state demand:

A. Whereas the Stranded Gas Development Act requires applicants to describe methods and terms under which the applicant is prepared to make gas available to meet the reasonably foreseeable demand in Alaska within the economic proximity of the project;
B. Whereas the SGDA states that an element of determining if a project is qualified is whether it is capable, subject to applicable commercial regulation and technical and economic considerations, of making gas available to meet reasonably foreseeable demand in this state;
C. Whereas the Alaska Constitution requires natural resources to be developed for the benefit of all Alaskans;
D. Whereas communities in Alaska desire affordable and clean energy from the gas pipeline;
E. Whereas affordable, clean energy is a component of economic development and quality of life throughout the state;
F. Whereas a gas pipeline likely will transport large quantities of natural gas liquids under high pressure, and any takeoff on the pipeline for local access to gas likely

will be expensive and may require facilities to remove the natural gas liquids, making the location of extraction of NGLs important to Alaska communities;

G. Whereas the tariff established for gas transported to takeoff points within Alaska should be calculated for the actual transportation costs to those points;

H. Whereas AS 38.35.120(a) and AS 42.05.711-42.06.370 may act to prohibit access to North Slope natural gas by many or all communities in Alaska;

I. Whereas South Central Alaska has had access to an abundant supply of low-cost natural gas from the Cook Inlet Basin, which is forecasted to meet existing demand until approximately 2012;

J. Whereas Interior Alaska would benefit from having access to natural gas either for industrial uses or distribution or for generating lower cost electricity;

K. Whereas Southeast Alaska communities are isolated and largely rural, and rely on importing oil from lower 48 suppliers for most energy needs; and an alternative source of clean, efficient and cost-effective energy offers a high likelihood of beneficial effect on economic development and quality of life for residents of the Southeast region;

Be it therefore resolved:

1. The Municipal Advisory Group requests the State of Alaska to include the placement of multiple, strategic takeoff points in the rural and urban areas of Interior, South Central and Southeast Alaska as part of the construction project along the route of any natural gas pipeline from Alaska's North Slope in its negotiations with successful applicants.
2. AS 38.35.120(a) and AS 42.05.711-42.06.370 should be amended to provide greater assurance that communities in Alaska, to the greatest extent practicable, will have access to North Slope natural gas from any trans-Alaska natural gas pipeline.
3. The State of Alaska should retain its rights to take the State's royalty share of natural gas in kind in order to provide maximum access to natural gas to meet the future needs of the communities, businesses and regions of Alaska.

RESOLUTION 2004-04: REVENUE PILT

A Resolution Outlining the Parameters of a Revenue PILT Acceptable to Municipalities:

A. Whereas no reduction or deferral in municipal taxes is acceptable without appropriate justification from the State of Alaska and the project sponsor;

B. Whereas a payment in lieu of taxes structure should provide certainty for municipalities;

C. Whereas the State of Alaska should ensure any payment in lieu of taxes recognizes the loss to present and future forms of local government of the opportunity to respond to changing conditions through changing tax rates;

D. Whereas a payment in lieu of taxes does not mean a reduction in taxes;

E. Whereas the State of Alaska should ensure that affected municipalities' combined share of the economic rent of the approved project should correlate with the revenue stream of the project by negotiating that the present value of the aggregate amount of payment in lieu of taxes is not less than the amount that would have been collected under AS 43.56, AS 29.45 and AS 29.46;

F. Whereas project sponsors have indicated the existing tax structure front-loads their expenses and property taxes are due before a revenue stream is in place;

G. Whereas revenue affected municipalities want to avoid the drastic decrease in revenues that would be possible at the end of the contract term if valuation methods changed and the Alaska Natural Gas Pipeline continued;

Be it therefore resolved that:

1. In the event that a payment in lieu of taxes is found to be acceptable to the municipalities, a PILT based on the throughput of the proposed natural gas pipeline indexed* for inflation is preferable to other methods.
2. The throughput rate per mcf established under the Stranded Gas Development Act for the PILT should approximate taxes that would have been collected under AS 43.56.
3. The negotiated PILT should include a continuation clause in the original contract for the Alaska Department of Revenue to have the option to extend the throughput method of payment in lieu of taxes through the life of the project, rather than the life of the contract.
4. PILT payments should be made directly to affected municipalities and should not be subject to appropriation by the legislature.
5. The structure of the State of Alaska PILT for property taxes in the unorganized borough should allow that as new local governments form, they will have access to a share of State PILT revenues in order to provide a reasonable tax base.
6. PILT payment should be made proportionally to each municipality based on its mill rate on an annual basis.

**Indexing instrument needs to be added*

RESOLUTION 2004-05: CONSTRUCTION PILT

A Resolution Outlining the Parameters of a Construction Impacts PILT to Municipalities:

A. Whereas construction of an Alaska gas pipeline will bring impacts to municipalities;

B. Whereas construction impacts of the project will begin prior to gas pipeline construction, continue through the projected three-year construction period, and phase out a year after construction ends;

C. Whereas the State has eliminated or reduced assistance to potentially impacted municipalities and has begun the discussion of gas pipeline construction impacts to municipalities;

D. Whereas funding for construction impacts and need for services as a result of construction may not parallel each other;

E. Whereas adequate construction PILT funds must begin prior to construction to provide timely, effective services to residents;

F. Whereas maximum Alaska hire will result in fewer construction impacts to municipalities by reducing unemployment, in-migration and need for increased services;

G. Whereas an increase in general wages within the affected municipalities will result from limited availability of personnel for jobs during construction of the gas pipeline, and the effects of that wage inflation are likely to linger after construction ends;

H. Whereas municipalities have particular concerns about the impacts of gas pipeline construction on their road systems and infrastructure;

Be it therefore resolved:

1. Payment in lieu of taxes must fund impacts of gas pipeline construction with phasing appropriate to provide funds for specific service delivery.
2. Project sponsors and the State of Alaska should expend maximum efforts to ensure Alaska hire, thus mitigating the need for new municipal services to support an influx of Outside workers.
3. Apart from construction or revenue PILTs, the State of Alaska Legislature and Administration should provide financial assistance to impacted communities not receiving a revenue PILT.
4. PILT payments should be transmitted directly to municipalities by the payors, as would be the case for tax payments.

RESOLUTION 2004-06: ALASKA HIRE

A Resolution Outlining Voluntary Measures to Ensure Maximum Alaska Hire for the Alaska Natural Gas Pipeline

A. Whereas Alaska residents should benefit from natural resource development by having access to both construction and operation jobs of the Alaska Natural Gas Pipeline;

B. Whereas increased Alaska hire will lead to mitigated impacts on affected municipalities by reducing the need for new services;

C. Whereas in 1998 the Alaska North Slope Gas Commercialization Team (Commissioners Will Condon and John Shively and Attorney General Bruce Bothello) made recommendations for voluntary measures to ensure Alaska hire;

D. Whereas the team conducted its work against a background of U.S. and Alaska Supreme Court decisions striking down previous Alaska Hire efforts;

E. Whereas the group sought to avoid these problems by recommending requirements and voluntary measures for Alaska Hire efforts on the part of gas pipeline/export project employers;

F. Whereas the Municipal Advisory Group endorses these requirements and voluntary measures to ensure maximum training and hiring of Alaskans;

G. Whereas the realization of maximum local hire can be of benefit to the communities of Alaska and the companies involved in construction and operations of an Alaska Natural Gas Pipeline;

Be it therefore resolved:

1. The State of Alaska should require project sponsors to submit a plan outlining specific measures to hire qualified Alaskans; to train, in a timely fashion, Alaskans who are capable of becoming qualified; and to contract with Alaska businesses. The plan should include scheduled benchmarks for achieving the training and hiring of Alaskans.
2. The State of Alaska should require project sponsors and gas pipeline contractors to advertise within Alaska for positions, and to use State of Alaska job service organizations to notify the Alaska public regarding jobs.
3. The State of Alaska should require quarterly unemployment insurance submittals by project sponsors and gas pipeline contractors to identify employees and employers involved in project construction throughout the state.
4. The Alaska Department of Labor and Workforce Development should create a statistical indicator of the number of Alaska resident and nonresident employees involved in project construction by comparing quarterly UI submittals against other indexes of Alaska residency, such as PFD qualifications and drivers licenses.
5. The State Commissioner of Labor and Workforce Development should prepare and present to the legislature an annual report, by employer, that identifies the numbers of Alaska residents working on the gas pipeline project.
6. The State of Alaska should negotiate Alaska hiring goals and should develop incentives to reward project sponsors that achieve those goals.

RESOLUTION 2004-07: INTERRUPTION DURING CONSTRUCTION

A Resolution Regarding Interruption During Construction of the Natural Gas Pipeline and Related Effects on a Construction PILT:

A. Whereas the PILT proposed for construction impacts would be phased over a five year period – one year of pre-construction, three years of construction and one year of post construction;

B. Whereas some construction impacts will require expenditures by municipalities and communities prior to commencement of service delivery;

C. Whereas preparation for some construction impacts, such as increased call volumes to local police departments, State Troopers and VPSOs, requires significant lead time for recruiting, training and hiring new employees;

D. Whereas purchase of equipment such as ambulances requires a commitment of funds and subsequent significant lead time between ordering and delivery;

E. Whereas an interruption in construction of a gas pipeline would cause negative impacts in affected communities due to economic uncertainty, changes in employment and social disruption;

F. Whereas a halt in construction would create a need for affected communities to adjust recruitment and hiring, ordering of equipment, or other issues;

G. Whereas once the recruitment and hiring of employees to respond to construction impacts has begun, it becomes imperative that construction PILT funds be maintained even if construction is interrupted;

Be it therefore resolved:

If construction of the natural gas pipeline halts, the flow of construction-related PILTs to the affected communities should continue for up to twelve months of an interruption.

RESOLUTION 2004-08: PROVISIONS FOR EXPANSION

A Resolution Recommending Maximum Effort to Require Provisions for Expansion of a natural gas pipeline to accommodate additional exploration and production.

A. Whereas Alaska's North Slope holds the potential for tremendous reserves of undiscovered natural gas;

B. Whereas article 8, sections 1 and 2 of the Alaska State Constitution declare that it is the policy of the state that the development of its resources be made available for maximum use consistent with the public interest and for the maximum benefit of its people;

C. Whereas it is in the best interest of the state to provide for maximum competition in the development of its natural gas resources;

D. Whereas it is vital that a natural gas pipeline project make provisions to accommodate future exploration and production;

E. Whereas the state of Alaska has the authority to require certain provisions under the Right of Way leasing act and the Stranded Gas Development Act;

F. Whereas recently passed federal legislation, Section 101 of "The Alaska Natural Gas Pipeline Act" provides the Federal Energy Regulation Commission the authority to order the expansion of a natural gas pipeline under certain conditions;

Be it therefore resolved:

1. The State of Alaska should include in contract negotiations under the Stranded Gas Development Act and the Right of Way leasing act provisions for expansion of the natural gas pipeline to accommodate future exploration and production; and
2. The State of Alaska should protect Alaska's interest in the upcoming FERC rulemaking process and should utilize its standing with FERC to encourage an order for expansion when it is determined to be in the best interest of the state.

Approved by vote:

Yes: City of Fairbanks, Fairbanks North Star Borough, Kenai Peninsula Borough, City of Kenai, Tanana Chiefs Conference, City of Skagway

No: North Slope Borough

Appendix B: Municipal Profiles

Municipalities represented in the Municipal Advisory Group are profiled below. The advisory group was formed under the Stranded Gas Development Act and includes municipalities that the state believes may be economically or revenue affected by gas pipeline construction and operation. For purposes of the SGDA, a municipality is considered economically affected if it will be required to provide additional public services under the terms proposed in an application. A municipality is considered revenue-affected if it will be restricted from imposing a tax, or a portion of a tax, as a result of implementation of a gas pipeline construction contract.

Municipality of Anchorage

COMMUNITY OVERVIEW

Type of government. Unified Home Rule Municipality

Land Area. 1,697.2 square miles

Population. 274,003

Area-wide powers. Education, planning, animal control, fireworks control, health & environmental protection, library, mass transit, zoning, taxicab, rights-of-way use, parking, sewers.

Non-area-wide powers. Building safety and police.

Municipal facilities and utilities. Piped water, piped sewer, electric, refuse collection, landfill, police, investigations, drug enforcement, jail, fire, EMS/ambulance, building safety, airport, harbor/port, schools, libraries, museum, planning/zoning, building safety/building permits, animal control, roads, transit, parking, parks and recreation, swimming pools, human services, Alaska Center for the Performing Arts, Heritage Land Bank, community development, environmental protection, historic preservation.

REVENUES

Sources of funding. Property tax (16.37 mills), bed tax (8 percent) rental care tax (8 percent), tobacco tax (15 percent), aircraft tax (flat).

Area-wide revenue

	Property Tax	Bed Tax	Rental Car Tax	Tobacco Tax	Aircraft Tax
2003 Tax Revenue	$315,874,931	$11,007,248	$4,682,406	$5,349,091	$202,860

Total other revenue: $330,429,061

	Real Property	Personal Property
2003 Locally Assessed Values	$17,225,701,316	$1,854,219,932
2003 Full Values	$18,257,724,400	$2,910,767,100

Non-area-wide revenue. There are 44 service areas. The lowest mill rate was 8.87 and the highest was 16.61 in 2003.

	General Government	Education	Fire	Roads/ Drainage	Police	Parks & Recreation	Building Safety
Mill Rates	1.50	7.37	1.64	3.10	2.25	0.74	0.01

Other considerations. Revenue cap set at previous years revenue plus CPI, new construction, bonding, voter approved services, taxes for new judgments and special appropriations on an emergency basis.

Current taxes under AS 43.56. 2003 State Taxable Oil & Gas Full Value: $46,183,220

SERVICES PROVIDED

Area-wide services. Economic and community development, animal control, fire, emergency, planning, zoning, police, ports and harbors, Memorial Cemetery, Merrill Field, public works, tourism, public transportation, light and power, community health and social services, libraries, environmental services, tax assessment and collection, parks and recreation, water and wastewater utility, street maintenance, facility and fleet maintenance, solid waste services, Heritage Land Bank, water and sewer.

Contribution to education

	Total Education Expenditure	State and Federal Education Funds	Local Education Funds
2002	$443,295,182	$240,687,660	$202,607,522

EXISTING CONDITIONS

Relevant infrastructure. Anchorage has over 162 parks, including 10 large reserves, George Sullivan Sports Arena, Alaska Performing Arts Center, Egan Convention Center, piped water, piped natural gas, electricity, landfill, hazardous wastes and waste oil collection, airport, harbor/dock, mass transit, parks and recreation, schools, fire, EMT services, library, police.

Education and training. Enrollment in Anchorage's 92 schools in FY03 was 49,316. Staffing of 2,900 teachers creates a student/teacher ratio of 17.1.

Training opportunities available in Anchorage are provided through apprenticeship programs, most for union labor positions. There is currently a need for approximately 1,650 welders, 755 heavy equipment operators, 1,250 laborers, 2,000 operating engineers, and 135 surveyors. During 2002, there were 774 graduates from apprentice programs in Anchorage.

Municipal funding. Funding for the city of Anchorage is derived from local taxes, license/permits, service charges, enterprise and other local revenue for a total local operating revenue of $535,756,277 (FY02). The State and Federal governments also contribute education funding of $240,687,660 and an additional $69,971,256 of non-educational revenue for a total of $310,658,916 of outside operating revenues.

Sources: Alaska Taxable 2003, Alaska Department of Community and Economic Development; Community Online Database, Alaska Department of Commerce, Community and Economic Development; Online statistics and reports, Alaska Department of Education and Early Development; Earlene Aquino, personal communication.

Deltana Area

COMMUNITY OVERVIEW

The Deltana area includes the City of Delta Junction, the roadbelt communities of Big Delta, Deltana, Fort Greely, White Stone, and the Native community of Healy Lake.

Type of government. Unorganized Borough. The City of Delta Junction is a Second Class City and is the only incorporated community in the area. The City has appointed a commission to draft a home-rule charter for a proposed borough that would follow the boundaries of the current Delta/Greely Rural Education Attendance Area (REAA). If a borough is formed, commission members expect the city government to be dissolved (Minutes, City of Delta Junction Charter Commission, 3/17/04).

Area (REAA): 6,228 square miles

Population (REAA): 3,725 (Census 2000)

The City of Delta Junction provides limited road service, fire and rescue services, and operates the City Hall, Community Center, airport, recreation building, library, landfill, radio and television translators, and cemetery. The City also owns the Visitor Center which is operated by the Chamber of Commerce. It is not known what powers a newly formed borough would exercise. A recent study on regional government options notes that a prospective borough could reasonably be anticipated to provide the three mandatory powers of a borough—education, taxation and planning—in addition to taking over the existing city services.

REVENUES

Sources of funding. Delta Junction currently has no property, sales or special taxes. Over half of Delta Junction's budget currently comes from federal transfer payments in the form of PILT, which compensate the city for a portion of the non-taxable federal lands in the unorganized borough. These payments, secured by Senator Stevens, are subject to annual authorization by Congress. The city also has been a recipient of a sizable federal impact grant. A portion of the grant is used for operational expenses.

In the past, state revenue in the form of revenue sharing, municipal assistance, and other payments have been a major source of funding. Revenue sharing and municipal assistance have been discontinued however, eliminating two sources of state funding. The balance of the city budget is funded by service charges and other local revenues.

City of Delta Junction, 2002 Municipal Revenues						
Local Tax Revenue	Service Charges, Other Local Revenue	State Operating Revenue	Federal Operating Revenue	Total Operating Revenue	State/Fed Capital Project Revenues	Total All Revenues
$0	$205,750	$191,421	$570,104	$967,275	$57,790	$1,025,065

Full assessed value. The City of Delta Junction does not levy a property tax. However, the full value of real and personal property that could be taxed under state law was estimated at $47,268,300 by the State Assessor in 2003.

A recent study estimated the value of non-oil and gas real and personal property in the prospective borough at $100 million.

Other considerations. As a local government that does not currently levy taxes, the City of Delta Junction is not considered a revenue-impacted community for the purposes of this study. However, it is likely to have local taxes (probably under a borough) by the beginning of pipeline operation.

Current taxes under AS 43.56. Though not currently taxed, in 2004 there is an estimated $210.7 million in oil and gas properties as defined by Alaska Statute 43.56 in the Deltana area.

SERVICES PROVIDED

Area-wide services. K-12 education is provided through the Delta/Greely REAA.

The City of Delta Junction has traditionally provided many services on an area-wide basis, including library, landfill, radio and television, community center, airport and EMT services. The city maintains the cemetery and city park and owns several community buildings. Road service is limited to 29 miles of roads at this time. Road service would greatly expand upon Borough formation. The City provides full fire service inside the City Limits and has a joint response agreement (With the Rural Deltana Volunteer Fire Department) to automatically respond outside of the City limits

Non-area-wide services. The U.S. Military provides a piped water system, police, fire and EMS services on Fort Greely and operates its own landfill and incinerator on Fort Greely.

The Healy Lake Village Council operates the washeteria, landfill and provides some sewage system maintenance. (Healy Lake would apparently prefer to not be in a Delta Borough and would desire to move to the Gateway REAA and remain in the unorganized area. The City wished to honor and advance Healy Lake's wishes.)

Contribution to education

	Local contribution	State aid
2003	$0	$5,468,704

EXISTING CONDITIONS

Relevant Infrastructure

- **City of Delta Junction**. Landfill, airport, city park, community center, city hall, visitor's center, library, city hall, recreation building, Delta Rescue Squad/EMS/Ambulance, Delta Junction Volunteer Fire Department (inside City) and Rural Deltana Volunteer Fire Department (outside City Limits), Delta

Junction Health Clinic/Family Medical Center, Public Health Nurse; 29 miles of secondary roads.

- **Healy Lake**. Healy Lake Clinic, operated by Tanana Chiefs Conference.
- **Fort Greely**. Military Police, Ft. Greely Fire/EMS

Education and training. With the construction of a new grade school and the closure of the Fort Greely school, the Delta school will be at capacity in FY 04/05. Enrollment in FY04 is 1,036 students. Projected enrollment for FY05 is 1,105 students. Staffing levels include 60 teachers in FY04 and 62 in FY05.

The Delta Career Advancement Center is supported by a consortium of educational partners and the City of Delta Junction. The facility is positioned to support select gasline construction and operation-related training needs. In FY04, there were 21 students in apprenticeship programs. Twenty-seven students are expected to participate in FY05.

Municipal funding. Funding for the City of Delta Junction is from grants and federal revenue sharing. Both are subject to annual appropriations. Federal Impact funds used for operating expenses will cease to be available in the next year or so. This coupled with less funding available for unrestricted uses will pose problems for the community. Lacking a tax base, the city's funding cannot be characterized as adequate or stable.

Existing wage structure. The City of Delta Junction municipal jobs are considered marginally competitive at best. The city has lost two employees to the missile defense project because of salary and benefits. City skilled craft jobs are far below Davis-Bacon wage levels, but include City paid health insurance and PERS retirement benefits at the current time.

PERS Status. City of Delta Junction employees belong the state Public Employees Retirement System (PERS). The city supports a total of five administration positions, one equipment operator and 1.5 librarians. The city administrator is already retired under PERS. There are two employees who may be within a few years of both vesting and retirement age. Overall, the city may be at risk of losing one to three employees if a short-term gasline project offered well-paid jobs in the next 2-4 years.

Sources: Lamar Cotten, Regional Government Options Study: Delta-Ft. Greely Regional Educational Attendance Area. Anchorage, 2003; Alaska Taxable 2003, Alaska Department of Community and Economic Development; Community Online Database, Alaska Department of Commerce, Community and Economic Development; Minutes, Delta Charter Commission, March 17, 2004; Pete Hallgren, personal communication.

Fairbanks North Star Borough

COMMUNITY OVERVIEW

Communities located within the Borough include: College, Eielson Air Force Base, Ester, Fairbanks, Fort Wainwright Army Base, Fox, Harding Lake, Moose Creek, North Pole, Pleasant Valley, Salcha, and Two Rivers. The borough was incorporated January 1, 1964.

Type of government. Second Class Borough.

Land Area: 7,366.2 square miles

Population: 82,214

Area-wide powers. Property assessment and tax collection, public schools, planning and zoning, animal control, flood control, hospital (not exercised) library, air pollution control, disaster and civil defense, enhanced 911, solid waste disposal, parks and recreation, transportation system, child care assistance, and limited health and social services powers.

Non-area-wide powers. Fireworks control, emergency medical services, solid waste bonds, and economic development. These powers are exercised in the area of the borough outside the cities of Fairbanks and North Pole.

Special district powers. Solid Waste Collection powers are exercised in a special district created in 1991 that includes the area outside the City of Fairbanks.

Service area powers. Road maintenance and construction, fire protection, water supply, sewage disposal, and streetlights in specific service areas. These services are exercised in specific areas upon petition and adoption by the vote of the residents of the specific service area. Currently (2004) there are 112 active service areas in the borough.

REVENUES

Sources of funding. Areawide property tax (13.693 mills), non-area-wide and service area mill rates (varied) and bed tax (8 percent).

Area-wide revenue

	Property Tax	Bed Tax	Oil & Gas Property Tax
2003 Tax Revenue	$68,013,870	$1,305,822	$4,186,881

Total other revenue: $31,031,515

	Real Property	Personal Property
2003 Locally Assessed Values	$4,181,394,702	$0
2003 Full Values	$4,472,213,500	$675,760,400

Non-area-wide revenue. There are 112 service areas.

	General Government	Education	Fire	School & Library Bonds
Mill Rate	4.934	7.767	Varies	.992

Other considerations. Revenue (tax) cap set at previous year revenue plus CPI, new construction, bonding, voter approved services, taxes for new judgments and special appropriations on an emergency basis.

Current Taxes under AS 43.56. State taxable oil & gas full value $270,805,700 (2003)

SERVICES PROVIDED

Area-wide services. Education, animal control, planning, zoning, public works, public transportation, limited health and social services, libraries, tax assessment and collection, parks and recreation, solid waste disposal.

Non-area-wide services. Solid waste collection, economic development, and emergency services.

Contribution to education

	Total Education Expenditure	State and Federal Education Funds	Local Education Funds
2003	$144,671,046	$ 101,051,721	$43,619,325

EXISTING CONDITIONS

Relevant infrastructure. FNSB owns and maintains all K-12 school facilities, numerous parks, libraries, community activity center, borough building, maintenance facility, health center, a class 1 landfill, transfer sites for solid waste collection, which is then buried at the landfill. There are 127 service areas for roads, fire and EMS service that are supported by service area mill rates and grant funds.

Education and training. FNSB has 32 K-12 school facilities educating 14,594 students. There are 842 teachers employed by the district. Student/teacher ratio for 2004 is 17.3.

Municipal funding. FNSB has recently been impacted by the elimination of State revenue sharing and municipal assistance and the capital matching grant program. FNSB maintains an unrestricted fund balance of approximately $9,000,000.

Other considerations. Director of Human Services estimated that wages at the Borough are not generally competitive with the exception of clerical/secretarial wages.

Sources: Alaska Taxable 2003, Alaska Department of Community and Economic Development; Community Online Database, Alaska Department of Commerce, Community and Economic Development; Online statistics and reports, Alaska Department of Education and Early Development; Lori Backes, personal communication.

City of Fairbanks

COMMUNITY OVERVIEW

Type of government: Home Rule City

Land Area: 31.9 square miles

Population: 29,486

Powers. Animals, buildings and building regulations, cemeteries, emergency services, health, police, solid waste.

Revenues: $20,820,857 (2004 estimate)

Sources of funding. Property taxes, bed tax (8 percent), tobacco (8 percent) and alcohol tax (5 percent); licenses and permits fees, charges for services, interest earnings.

	Property Tax	Bed Tax	Alcohol Tax	Tobacco Tax
2003 Tax Revenue	$8,602,553	$1,786,026	$1,162,927	$799,567

Other considerations. Tax revenue cap, set at previous years revenue plus CPI, new construction, bonding, voter approved services, taxes for new judgments and special appropriations on an emergency basis.

SERVICES PROVIDED

Area-wide services. Road maintenance, solid waste collection, police, fire, ambulance, building regulations, cemeteries, licensing

Contribution to education. Fairbanks North Star Borough provides education to the Fairbanks area.

EXISTING CONDITIONS

Relevant infrastructure. Police station, fire station, City Hall, Birch Hill and Clay Street cemeteries; 238.05 lane miles of road.

Sources: Alaska Taxable 2003, Alaska Department of Community and Economic Development; Community Online Database, Alaska Department of Commerce, Community and Economic Development; Ron Woolf, personal communication.

City of North Pole

COMMUNITY OVERVIEW

The City of North Pole is within the Fairbanks North Star Borough.

Type of government: Home Rule City

Land Area: 4.2 square miles

Population. 1,683

Area-wide powers: Police protection, fire/EMS, water and sewer service, building permits.

REVENUES

Sources of funding. Property tax (3.0 mills city, 16.849 mills borough), sales tax (3% with some exemptions, maximum $6 collected per sale).

	Property Tax	Sales Tax
2003 Tax Revenue	$755,335	$1,336,630

	Real Property	Personal Property
2003 Locally Assessed Values	$259,625,644	$0
2003 Full Values	$297,685,700	$0

SERVICES PROVIDED

Area-wide services. The city provides police, fire and emergency medical services to residents, maintains roads within the city limits and operates water and wastewater treatment facilities. Ambulance service extends from the borders of Fort Wainwright to the borders of Eielson Air Force Base.

Contribution to education. Fairbanks North Star Borough provides K-12 education.

EXISTING CONDITIONS

Relevant infrastructure. Piped water and sewer facilities, police and fire stations, municipal buildings I and II.

Sources: Alaska Taxable 2003, Alaska Department of Community and Economic Development; Community Online Database, Alaska Department of Commerce, Community and Economic Development.; Personal communication, Jeff Jacobson.

Haines Borough

COMMUNITY OVERVIEW

Communities located within the Borough include: Covenant Life, Haines, Lutak, Mud Bay and Mosquito Lake.

Type of government: Home Rule Borough

Land Area: 2,343.7 square miles

Population: 2,327

Area-wide powers. Harbor/port, EMS, volunteer ambulance, economic development and tourism, public parks, borough library, Sheldon Museum, disaster planning and response, solid waste management, planning, platting and zoning, education, taxation, issue bonds or other indebtedness, hazardous substance control, fire service, docks and harbors.

Service area powers. Piped water, piped sewer, police, volunteer fire, road maintenance, and animal control.

Municipal facilities and utilities. Schools, Klehini Valley Volunteer Fire, roads, public library, Sheldon Museum and Cultural Center, Chilkat Center, youth development, cemeteries, Senior Citizen Center, Public Safety Building, Lutak Dock (freight), Port Chilkoot Dock (cruise ship), parks (4), cemetery.

REVENUES

Sources of funding. Property tax (6.56 mills Borough, 12.08 mills in City of Haines), sales tax (1.5 percent Borough, 5.5 percent in City of Haines), bed tax (4 percent).

Area-wide revenue

	Property Tax	Sales Tax	Bed Tax
2003 Tax Revenue	1,814,863	$1,780,831	$89,741

Total other revenue: $3,363,282

	Real Property	Personal Property
2003 Locally Assessed Values	$1,61,242,488	$14,728,333
2003 Full Values	$177,086,502	$14,802,333

Non-area-wide revenue. There are four service areas. The lowest service area mill rate was 6.23 and the highest was 12.08 in 2003.

	General Government	Education	Fire

Various Mill Rates	4.04	6.23	1.81

SERVICES PROVIDED

Area-wide services. Economic development, emergency medical, planning, zoning, ports and harbors, public works, tourism.

Non-area-wide services. Water and sewer, police, fire, road maintenance, and animal control.

Contribution to education

	Total Education Expenditure	State and Federal Education Funds	Local Education Funds
2003	$ 4,701,357	$ 2,974,057	$ 1,727,300

EXISTING CONDITIONS

Relevant infrastructure. The municipality provides piped water, piped sewer, class 3 landfill, health center, volunteer fire/EMS, ambulance, police, jail, senior housing, library, Chilkat Center for the Arts, Sheldon Museum and Cultural Center.

Haines is a major trans-shipment point because of its ice-free, deep water port and dock, and year-round road access to Canada and Interior Alaska. It is a northern terminus of the Alaska State Ferry System, and a hub for transportation to and from southeast Alaska. The Chilkat Bald Eagle Preserve draws visitors from around the world.

Education and training. Haines Borough has four schools staffed by 28.43 teachers. 2003 enrollment was 324 students. Student/teacher ratio was 11.4.

Sources: Alaska Taxable 2003, Alaska Department of Community and Economic Development; Community Online Database, Alaska Department of Commerce, Community and Economic Development; J. Robert Venables, personal communication.

Kenai Peninsula Borough

COMMUNITY OVERVIEW

Type of Government: Second Class Borough

Land Area: 16,221 square miles

Population: 51,220 in 2003

Area-wide powers. Education, planning, solid waste disposal, emergency management, limited economic development, fire, hospitals, emergency medical, recreation facilities, road maintenance, senior citizens services.

Municipal facilities and utilities. Central Kenai Peninsula Hospital, South Peninsula Hospital, schools, fire, EMS/ambulance, landfill, senior citizens programs, planning, coastal zone management, swimming pools, roads and trails, Kenai River Center, environmental protection.

REVENUES

Sources of funding: Property tax, a 2% sales tax, and oil & gas property tax revenues.

Area-wide revenue

	Property Tax	Sales Tax	Oil & Gas Property Tax
2003 Revenue Generated	$41,693,443	$14,370,582	$8,040,603

	Real Property	Personal Property
2003 Locally Assessed Values	$3,436,018,329	$202,696,677
2003 Full Values	$3,995,787,400	$708,607,800

	General Government and Education	Hospital Service Area (non-area-wide revenue)
Mill Rate	6.5	1.1

Sales Tax is 2 percent borough-wide and is included in the following city rates:

6.5%	5.5%	5.0%	4.0%	2.0%
Seldovia (April – September)	Homer	Kenai Seward Soldotna	Seldovia (October – March)	KPB Uninc. (KPB)

Current taxes under AS 43.56. State taxable oil & gas full value $638,617,190 (2003)

SERVICES PROVIDED

Area-wide services. The borough provides education, planning, solid waste disposal, emergency management, limited economic development, fire, hospitals, emergency medical, recreation facilities, road maintenance, and senior citizen services.

Contribution to education

	Total Education Expenditure	State & Federal Funds	Local Education Funds
2003	$89,010,512	$12,658,402	$76,352,110

EXISTING CONDITIONS

Relevant infrastructure. Inside the borough, public services provided by municipalities include: police, fire, hospital, library, senior citizen services, senior citizen housing, post offices, and education. Four landfills provide waste and recycling services with more than 61,000 tons of solid waste processed during FY 2002/2003. The cities of Homer, Seldovia, Seward, Spring Creek, and Wildwood operate municipal jails. Combined occupancy available is approximately 872 inmates.

Education and training. K-12 education is provided by the Kenai Peninsula Borough School District. The district has 43 schools with a total of 9,645 students and 674 on staff. The student/teacher ratio for 2004 is 15.2. Kenai Peninsula College is part of the University of Alaska system.

Training for welding, advanced drivability, heavy equipment operation and inspection/maintenance is provided thru AVTEC and UAA. In 2002, graduates from the combined courses totaled 393.

Sources: Alaska Taxable 2003, Alaska Department of Community and Economic Development; Community Online Database, Alaska Department of Commerce, Community and Economic Development; state demographer.

City of Kenai

COMMUNITY OVERVIEW

Type of government: Home Rule City

Area: 35.5 square miles

Population: 7,125

Area-wide powers. Police, fire/EMS, road maintenance, water and sewer, parks and recreation, harbor/dock.

Municipal facilities and utilities. Piped water, piped sewer, airport, harbor/dock, police, fire/EMS, roads, library, Kenai Senior Center, and parks and recreation.

REVENUES

Sources of funding. The city's property tax rate is 4.5 mills (an additional 7.6 mills goes to the borough and the hospital service area). Kenai has a 5 percent sales tax, of which 2 percent goes to the borough.

	Property Tax	Sales Tax	Oil & Gas Property Tax
2003 Tax Revenue	$1,389,599	$3,953,561	$20,605

	Real Property	Personal Property
2003 Locally Assessed Values	$331,864,800	$29,635,550
2003 Full Values	$377,939,600	$101,591,100

SERVICES PROVIDED

Area-wide services. Fire service, police, ambulance, and road maintenance.

Contribution to education. Educational services are provided by the borough.

EXISTING CONDITIONS

Relevant infrastructure. Landfill and health care facilities are provided by Kenai Peninsula Borough, on an area wide and service area basis respectively. Jail service is provided by the state at the correctional and booking facility at Wildwood.

Sources: Alaska Taxable 2003, Alaska Department of Community and Economic Development; Community Online Database, Alaska Department of Commerce, Community and Economic Development; state demographer; Richard Ross, personal communication.

City of Seward

COMMUNITY OVERVIEW

Type of government: Home Rule City

Land Area: 14.4 square miles

Population: 2,733 (2003)

Area-wide powers. Piped water, piped sewer, refuse (Borough contract), electric, harbor/port, Marine Industrial Center, police, volunteer fire/EMS, ambulance, animal control, jail (State contract), 911 dispatch (Borough contract), building safety, library, teen center, municipal building, parking, community development, parks & recreation, roads, cemetery.

REVENUES

Sources of funding. Property tax (9.72 mills), sales tax (3 percent), bed tax (4 percent).

Area-wide revenue

	Property Tax	Sales Tax	Bed Tax
2003 Tax Revenue	$712,175	$2,165,586	$217,482

Total other revenue: $840,645

	Real Property	Personal Property
2003 Locally Assessed Values	$155,905,200	$44,349,941
2003 Full Values	$175,842,600	$69,146,300

	General Government and Education
Mill Rate	9.72 (includes 6.5 mills for borough)

SERVICES PROVIDED

Area-wide services. Volunteer fire department, volunteer ambulance service, animal control, building safety, library, teen center, municipal building, parking, community development, parks and recreation, roads, cemetery.

Non-area-wide services. The search and rescue coverage area is the same as trooper coverage. Alaska State Troopers provide primary response and incident command, they coordinate with Coast Guard, Civil Air Patrol and EMS and Fire departments in the coverage area.

Contribution to education. Kenai Peninsula Borough provides educational services.

EXISTING CONDITIONS

Relevant infrastructure. Landfill, fire station, two hospitals, nursing home, library, senior citizen center, youth center, museum, city hall, police, school, post office, jail.

Seward planned improvement projects for the next five years include: highway improvements, arterial and street improvements with lights, expansion of small boat harbor, waterfront park planning and improvements, water and electric line upgrades, SMIC port and uplands development, IMS development (including new research vessel), hospital and nursing home improvements, new multi-agency/community center, new library/museum, flood mitigation projects, prison expansion, AVTEC expansion.

Sources: Alaska Taxable 2003, Alaska Department of Community and Economic Development; Community Online Database, Alaska Department of Commerce, Community and Economic Development.

North Slope Borough

COMMUNITY OVERVIEW

Type of government: Home Rule Borough

Land Area: 88,817.1 square miles

Population: 7,234

Area-wide powers. Education, taxation, planning and zoning.

Non-area-wide powers. Harbors.

Municipal facilities and utilities. Village water and wastewater systems, washeterias, electric, airports, landfills, refuse, Prudhoe Bay refuse and wastewater, schools, police, fire, search and rescue, health clinics, social services, day care, transit facilities, planning, roads, wildlife management, libraries, museum, Ilisagvik College.

REVENUES

Sources of funding. Property tax (18.56 mills)

Area-wide revenue

	Property Tax	Oil & Gas Property Tax
2003 Tax Revenue	$199,653,160	$194,692,108

Total other revenue: $31,623,981

NSB receives a payment in lieu of taxes (PILT) for economic development that replaces a local sales and use tax. PILT revenues comprise 2 percent of total tax revenue.

	Real Property	Personal Property
2003 Locally Assessed Values	$146,112,251	$104,813,240
2003 Full Values	$170,168,400	$107,163,700

	General Government and Education	Debt Service
Mill Rate	7.32	11.24

Other considerations. There is no local tax cap (use 225 percent state cap formula).

Current taxes under AS 43.56. Full value of state taxable oil and gas property: $10,463,871,080 (2003).

SERVICES PROVIDED

Area-wide services. Education (including college); assessment and collection of taxes; planning, platting, and land use regulation; zoning; Inupiat history, language and cultural commission; search and rescue (including disaster management), wildlife management, fish and game management, health and social services (including day care, infant learning program, parenting program, public assistance, senior citizens programs, children and youth services, behavioral health and prevention services, physician services, EMS, eye care program, dental program, veterinary clinic, community health aides, public health nursing), policing, fire, public works (electrical, water, waste collection, transit, roadway and drainage way maintenance, energy management (oil and gas), housing.

Non-area-wide services. Barrow: waste collection and disposal service, maintenance of streets, drainage ways, landfill, vehicle maintenance, transit services.

Contribution to education

	Total Education Expenditure	State and Federal Education Funds	Local Education Funds
2002	$50,255,723	$13,010,251	$37,245,472

EXISTING CONDITIONS

Relevant infrastructure. Village water and wastewater systems, washeterias, electric, airports, landfills, refuse, Prudhoe Bay Refuse and Wastewater, schools, police, fire, search & rescue, health clinics, social services, day care, transit facilities, planning, roads, housing program, libraries, museum, Ilisagvik College.

City of Skagway

COMMUNITY OVERVIEW

Type of government: First Class City

Land Area: 464.3 square miles

Population: 845

Area-wide powers. Fire, police, harbor, library, museum, public works, planning and zoning, municipal code enforcement, taxes, water/sewage and Dahl Medical Center.

Municipal facilities and utilities. Piped water, piped sewer, health clinic, refuse collection, incinerator, police, volunteer fire, harbor/dock, library, museum, schools, zoning, recreation center.

REVENUES

Sources of funding: Property tax (7.78 mills), sales tax (4 percent), bed tax (8 percent).

Area-wide revenue

	Property Taxes	Sales Tax	Bed Tax
2003 Tax Revenue	$1,148,146	$2,531,977	$91,782

Total other revenue: $314,120

	Real Property	Personal Property
2003 Locally Assessed Values	$205,046,300	$0
2003 Full Values	$218,832,800	$0

	General Government	Education
Mill Rate	7.78	6.25

SERVICES PROVIDED

Area-wide services. Economic development, fire, police, harbor, library, museum, public works, recreation center and Dahl Medical Center. The landfill is currently closed, however, the City operates an incinerator, baler, and ash fill facility. The community participates in recycling and annual hazardous waste disposal events. Alaska Power & Telephone Co., based in Skagway, provides power to Southeast and the Interior. It owns and operates diesel and hydro systems.

Non-area-wide Services. Search and rescue services provided by the State Troopers.

Contribution to education

	Total Education Expenditure	State and Federal Education Funds	Local Education Funds
2002	$2,953,858	$1,922,278	$896,547

EXISTING CONDITIONS

Relevant infrastructure. Library, water and sewer services, museum, city hall, fire/EMS services, police, harbor, Dahl Medical Center and civic center.

Education and training. Skagway has one school with a 2004 enrollment of 105.8 students and staffing of 12.7 teachers. Student/teacher ratio is 8.3.

Sources: Alaska Taxable 2003, Alaska Department of Community and Economic Development; Community Online Database, Alaska Department of Commerce, Community and Economic Development; Online statistics and reports, Alaska Department of Education and Early Development; Michael Catsi, personal communication.

City of Valdez

COMMUNITY OVERVIEW

Type of government: Home Rule City

Land Area: 277.1 square miles

Population: 4,060

Area-wide powers. Piped water, piped sewer, refuse collection, landfill, hospital, mental health, harbor/dock, airport, police, fire/EMS, library, jail, museum, roads, schools, parks and recreation, recreation hall, animal control, community development.

Sources of funding. Property tax (20 mills), bed tax (6 percent), oil and gas property.

Area-wide Revenue

	Property Tax	Bed Tax	Oil & Gas Property Tax
2003 Revenue Generated	$20,260,164	$256,803	$13,178,880

Total other revenue: $47,290,446

	Real Property	Personal Property
2003 Locally Assessed Values	$223,577,633	$168,041,619
2003 Full Values	$241,481,500	$212,711,500

Other considerations. Tax cap set at 20 mills. The cap does not apply to bonds.

Current taxes under AS 43.56. Full value of state taxable oil and gas property $657,583,710 (2003)

SERVICES PROVIDED

Area-wide services. Piped water, piped sewer, refuse collection, landfill, health care, mental health, harbor/port, police, fire/EMS, jail (under a state contract), animal control, library, museum, roads, schools, parks and recreation, day care program, community development.

Contribution to education

	Total Education Expenditure	State and Federal Education Funds	Local Education Funds
2003	$21,545,110	$5,676,827	$15,868,283

EXISTING CONDITIONS

Relevant infrastructure. Landfill, water and sewer system, airport, hospital, harbor/dock, police and fire/EMS facilities, senior citizen center, teen center, medical clinic, museum, library, parks, recreation hall, sports facilities, roads, schools, jail, senior citizen housing, civic center.

Education and training. Valdez has four schools with 854 students in 2004 and staffing of 58.5 teachers. The student/teacher ratio is 14.8.

Sources: Alaska Taxable 2003, Alaska Department of Community and Economic Development; Community Online Database, Alaska Department of Commerce, Community and Economic Development; Online statistics and reports.

Appendix C: Profiles of Small Communities in the Pipeline Corridor

Geographic Location	Demographics / Ethnicity	Economy / Employment	Public Protection	Subsistence Characteristics
Arctic Village ▪ East Fork of Chandalar River ▪ 100 miles N of Fort Yukon ▪ 290 miles N of Fairbanks	▪ 138 residents ▪ 130 residents (94 percent) are all or part Native	▪ Subsistence lifestyle is critical ▪ Any cash generally leaves the village for market goods and services ▪ Local school, clinic, village council, and stores are primary employers ▪ Of 59 potential workers, 28 (47.5 percent) are employed		▪ Waterfowl and muskrats are hunted in the spring, near breakup ▪ Fishing primarily occurs during spring and summer ▪ Fishing through lake ice occurs until December ▪ Caribou are harvested from August through March ▪ Trap lines operate from November through March ▪ Moose are generally hunted only in the fall ▪ Sheep are occasionally taken in the fall
Anaktuvuk Pass ▪ In Endicott Mountains (Brooks Range) ▪ On divide between John and Anaktuvuk Rivers.	▪ 259 residents ▪ 220 residents (85 percent) are all or part Native	▪ Economic opportunities are limited because of isolation ▪ Limited year-round employment ▪ Of the 154 potential workers, 26 were seeking work	▪ Anaktuvuk Pass volunteer fire service	▪ Caribou are intensely hunted in September. Continued hunting through November. Caribou are again intensely hunted March through May ▪ Sheep, grizzly bears and small mammals are hunted during fall time because they are fat ▪ Moose are harvested in September ▪ Fishing occurs May through January ▪ Trapping occurs November through March
Atqasuk ▪ On the Meade River ▪ 60 miles south of Barrow	▪ 247 residents ▪ 215 residents (94 percent) are all or part Native	▪ Education and other government work provide majority of employment ▪ Of the 121 potential workers, 4 were seeking work	▪ Atqasuk volunteer fire department	▪ Subsistence activities provide food sources ▪ Grayling, white fish, caribou, geese, ptarmigan, polar bear, seal, walrus and whale are harvested and traded ▪ Residents trap and sell furs to supplement cash income
Nuiqsut ▪ On the west bank of the Nechelik Channel of the Colville	▪ 433 residents ▪ 382 residents (89 percent) are all or part Native	▪ Unemployment is high in Nuiqsut ▪ Of the 264 potential workers, 17 were seeking work	▪ Nuiqsut volunteer fire department	▪ Trapping and craft-making provide some income ▪ Caribou, bowhead and beluga whale, seal, moose and fish are staples of the diet ▪ Polar bears are also hunted

Geographic Location	Demographics / Ethnicity	Economy / Employment	Public Protection	Subsistence Characteristics
River Delta				
Wiseman ▪ 10 miles N of Coldfoot ▪ On Dalton Highway	▪ 20 residents ▪ 3 residents (15 percent) are all or part Native	▪ Of the 16 potential workers, 8 held jobs, which were in mining industry ▪ Mixed subsistence/ cash economy	▪ No volunteer fire service ▪ Included in Fairbanks Troopers coverage area	▪ Caribou, moose and Dall sheep are primary large-game resources ▪ Community members actively share meat and other resources ▪ Only one household regarded fishing as a subsistence activity, because yearly fish catches are not a staple part of the diet. ▪ Residents feel increase in hunting/fishing competition in the Haul Road corridor. ▪ Wiseman residents actively garden as a source of vegetables ▪ In 1990-91 87 percent of the community was directly associated with trapping ▪ Length of traplines is anywhere from 2 to 80 miles
Coldfoot ▪ Mile 175 of the Dalton highway ▪ 7 Miles S of Wiseman	▪ 18 residents ▪ 0 residents are all or part Native	▪ Service community for Dalton Highway travelers	▪ EMT-I (1) ▪ State Troopers Post ▪ City Public Safety Office	▪ No subsistence activity documented in sources researched
Venetie ▪ North Bank of Chandalar River ▪ 45 miles NW of Fort Yukon	▪ 232 residents ▪ 218 residents (94 percent) are all or part Native	▪ Subsistence / cash economy ▪ Subsistence is critical ▪ 35 of 116 (30 percent) potential workers are employed ▪ 21 individuals are seeking work		▪ Fishing begins as soon as ice is gone in spring, some families move to the Yukon to fish for king and chum salmon by mid-June ▪ Ice fishing occurs during early winter ▪ Waterfowl hunting from early May to early June ▪ Black bears are harvested on occasion ▪ Households produce vegetables and gather berries throughout summer and fall ▪ Moose and occasionally caribou are harvested from September through December ▪ Trapping begins in November, lasts through early spring
Bettles and Evansville ▪ 180 air-miles north of Fairbanks ▪ South bank of Koyukuk River	▪ 69 residents ▪ 19 residents (57 percent) of Evansville are all or part Native ▪ 8 residents (22 percent) of Bettles are all or part Native	▪ Economy is linked to air transportation, visitor services and local government ▪ Year-round employment available through government, NPS, or Bettles Airfield ▪ 100 percent of residents over 16	▪ Fire service: 11 volunteers ▪ 2 pumpers, 1 brush, 1 tender, 1 special ▪ Included in Fairbanks Troopers coverage area ▪ Frank Tobuk	▪ About a third of households participate in subsistence fishing (1984) ▪ Only 3 households (9 percent) participated in waterfowl hunting (1984) ▪ Berries were harvested by 17 (53 percent) of the 32 home surveyed (1984) ▪ Moose harvest is a significant part of subsistence intake (1984) ▪ Data is lacking on amount of resources shared, but in most reports, resource sharing and distribution has been, and continues to be, an integral part of Koyukon culture

Geographic Location	Demographics / Ethnicity	Economy / Employment	Public Protection	Subsistence Characteristics
		residents over 16 are employed	Senior Health Clinic in Evansville	
Allakaket and Alatna ▪ Just SW of Alatna River – Koyukuk River confluence ▪ 190 miles NW of Fairbanks ▪ 57 miles upriver from Hughes	▪ 202 residents ▪ 190 residents (94 percent) are all or part Native	▪ Dependant on subsistence, few wage earning jobs ▪ Most jobs are part-time or seasonal ▪ Primary employers are the school, the city and the village corporation store ▪ 22 of 116 (19 percent) potential workers are employed	N/A	▪ Salmon comprised 61.5 percent of the total usable pounds harvested in 1982, other fish represented 15 percent ▪ Mammals represented 20 percent, birds 2.5 percent, and berries 1 percent of total usable pounds harvested ▪ Data is lacking on amount of resources shared, but in most reports, resource sharing and distribution has been, and continues to be, an integral part of Koyukon culture
Fort Yukon ▪ Yukon – Porcupine rivers confluence ▪ 145 air miles NE of Fairbanks	▪ 570 residents ▪ 484 residents (85 percent) are all or part Native	▪ 381 (65 percent) of residents are potential workers ▪ 170 (44 percent) are employed ▪ 61 (36 percent) are employed with state government ▪ 72 (42 percent) are employed with the private sector	▪ Fort Yukon EMS ▪ Yukon Flats Health Center	▪ Salmon comprise 62 percent of the subsistence harvest, mammals 23 percent ▪ 87 percent of the community participates in subsistence harvest, while 100 percent use subsistence resources ▪ Resources most commonly used: Chum salmon, Chinook salmon, pike, humpback whitefish, caribou, moose, ducks, geese, grouse, ptarmigan, vegetation and berries ▪ Spring: Waterfowl are harvested. Muskrat and black bear are actively pursued. Fishing begins ▪ Summer: Residents go to fish camps. Berries and vegetation are gathered ▪ Fall: Moose hunting, some caribou hunting. Chum and coho are harvested until freeze up ▪ Winter: Trappers put out lines when there is enough snow cover – trap until mid-March. Occasional moose harvests
Beaver ▪ North bank of the Yukon River. ▪ Halfway between Fort Yukon and Stevens Village	▪ 126 residents ▪ 119 residents (95 percent) are all or part Native	▪ Rely heavily on subsistence activities ▪ Wage earning opportunities are few ▪ Of the 66 residents aged 16 or older, 63.6 percent are not in the labor force	N/A	▪ 100 percent of households participate in a subsistence hunt ▪ 1985 per capita subsistence harvest: 730 lbs ▪ Salmon comprise 57 percent of the total harvest. Moose account for 17 percent, other mammals 10 percent, whitefish and pike 9 percent, other fish and birds 3 percent ▪ Moose is widely shared in the community, and also sent to relatives in other communities

Geographic Location	Demographics / Ethnicity	Economy / Employment	Public Protection	Subsistence Characteristics
		▪ 10 men and 1 woman worked on TAPS (1976)		
Birch Creek ▪ Located on Birch Creek ▪ 26 miles SW of Fort Yukon	▪ 35 residents ▪ 32 residents (90 percent) are all or part Native	▪ Subsistence / cash economy ▪ 25 village residents are 16 or older. Of these 13 (52 percent) are employed ▪ 0 residents are seeking work, making unemployment 0 percent	N/A	▪ Subsistence component relies heavily on large and small game. ▪ Both freshwater fish and salmon are also actively hunted ▪ Spring: Waterfowl arrives and is hunted; muskrat hunting is a primary spring hunting activity; black bear are occasionally taken ▪ Summer: Waterfowl continues to be hunted; some residents travel to fish camps; king salmon are harvested in early July; freshwater fish are harvested; chum salmon begin being harvested in late July ▪ Fall: chum salmon are harvested until late August; moose and black bear hunting are principle fall activities in Birch Creek; small animals and waterfowl are harvested until early October; berries are gathered ▪ Winter: freeze up in late October; fishing continues through December; trapping from November to late-March; hares, grouse and ptarmigans are harvested throughout the winter
Stevens Village ▪ North bank of Yukon River	▪ 92 residents ▪ 84 residents (91 percent) are all or part native	▪ 62 residents age 16 or older ▪ Of those, 17 residents (27 percent) employed	▪ Fire service: 2 staff (1 FT/1 PT), 18 volunteers ▪ 2 rescue, 1 rescue boat ▪ Stevens Village Health Clinic ▪ Included in Fairbanks Troopers coverage area	▪ Moose are usually harvested in the fall ▪ Bear are harvested incidentally to pursuing other subsistence activities ▪ Waterfowl are harvested primarily in the spring, and incidentally to pursuing other subsistence activities ▪ Hunting of small and large game is conducted in the winter along with trapping activities ▪ Freshwater fish and salmon make up 89 percent of the edible resources acquired; moose makes up 5 percent
Rampart ▪ South bank of Yukon River ▪ 75 miles upstream from Yukon – Tanana confluence	▪ 66 residents ▪ 63 residents (95 percent) are all or part native	▪ Rely heavily on subsistence ▪ Of 56 potential workers, 7 were employed in the community	▪ Fire service: none ▪ Rampart Health Clinic ▪ Included in Fairbanks Troopers coverage area	▪ 1995 harvest levels for salmon: 1,235 chinook, 1,104 summer chum, 2,803 fall chum ▪ Reported moose harvest 1990-1995: 12 moose, which may be conservative ▪ Data is lacking on amount of resources shared, however salmon is commonly shared in Interior communities. Moose Is widely shared as well.

Geographic Location	Demographics / Ethnicity	Economy / Employment	Public Protection	Subsistence Characteristics
Livengood ▪ 70 miles NW of Fairbanks ▪ On the Elliot Highway	▪ Not listed in the Census, therefore the full-time population is less than 25	▪ No permanent residents. ▪ Seasonal employment mainly in the mining industry	▪ Fire service: none ▪ Included in Fairbanks Troopers coverage area	▪ No subsistence activity documented in sources researched
Tanana ▪ North Bank of Yukon River ▪ 2 miles downstream from Tanana – Yukon confluence	▪ 301 residents ▪ 235 residents (78 percent) are all or part native	▪ Of the 241 residents 16 and older, 111 (46 percent) are employed ▪ 33 percent employed in education ▪ 20 percent in public administration ▪ 14.5 percent in other professional services	▪ Tanana Health Center ▪ Tanana EMS	▪ Moose are usually harvested in the fall ▪ Bear are harvested incidentally to pursuing other subsistence activities ▪ Waterfowl are harvested primarily in the spring, and incidentally to pursuing other subsistence activities ▪ Hunting of small and large game is conducted in the winter along with trapping activities ▪ Whitefish are harvested in early summer or fall ▪ 91 percent of the harvest in 1987 was freshwater fish or salmon ▪ Moose and king salmon are particularly important in the network of exchange and distribution in Tanana
Minto ▪ West bank of Tolovana River	▪ 248 residents ▪ 240 residents (97 percent) are all or part Native	▪ Residents rely significantly on subsistence harvest and redistribution ▪ Most full time jobs are with the school, clinic and village council ▪ Of 125 residents 16 and older, 23 are employed	▪ Fire service: 1 paid staff, 9 volunteers ▪ Minto Health Clinic ▪ Included in Fairbanks Troopers coverage area	▪ Moose are usually harvested in the fall, sometimes winter ▪ Bear are harvested incidentally to pursuing other subsistence activities ▪ Waterfowl are harvested primarily in the spring and fall, and incidentally to pursuing other subsistence activities ▪ Hunting of small and large game is conducted in the winter along with trapping activities ▪ Whitefish are harvested in early summer or fall ▪ Salmon and other fish made up 83 percent of the total harvest, with moose at 8 percent of total harvest
Manley Hot Springs and Eureka ▪ North of Tanana River ▪ End of Elliot Highway	▪ 88 residents ▪ 6 residents (7 percent) are all or part Native	▪ Local economy is driven by small businesses catering to tourists that visit the area ▪ Small scale mining still exists	N/A	▪ 64 species are reported as harvested by Manley Hot Springs and Eureka residents ▪ Salmon are harvested from the Tanana and Yukon rivers ▪ Moose are an extremely important resource for the residents, averaging 10.8 moose a year ▪ Caribou do not come near enough to Manley to be regularly harvested ▪ Local hunters hunt bear opportunistically and intentionally ▪ All of the resources harvested are shared in varying amounts ▪ The elderly, or anyone else in need usually receives portions of the meat first

Geographic Location	Demographics / Ethnicity	Economy / Employment	Public Protection	Subsistence Characteristics
Healy Lake Village ▪ 29 miles east of Delta Junction ▪ Not connected to road system	▪ 37 Residents ▪ Fluctuates seasonally ▪ 27 residents (73 percent) are all or part Native	▪ Largely subsistence based ▪ Few sources of wage employment ▪ 12 government related positions ▪ 11 private sector jobs	▪ Fire service: none ▪ Healy Lake Clinic ▪ Healy Troopers: 1 trooper in coverage area	▪ Moose hunted year round – heavily in the fall ▪ Caribou and waterfowl are actively hunted in spring and fall ▪ Dall sheep are taken in fall and early winter ▪ Fishing is done mostly during summer months
Dot Lake Area ▪ 50 miles NW of Tok ▪ 155 miles SE of Fairbanks ▪ On Alaska Highway	▪ 38 Dot Lake Village residents ▪ 19 Dot Lake residents ▪ 29 residents (51 percent) are all or part Native	▪ Majority of jobs are low paying and/or part time ▪ 5 service related jobs ▪ 3 professional / admin. ▪ 3 Education / Health/Social Services	▪ Fire service: none ▪ Dot Lake Village Health Clinic ▪ Tok Troopers	▪ Nearly all households participate in subsistence activity (1987) ▪ 60 percent of those households share harvest with other households (1987) ▪ Moose, caribou, sheep, grouse, ptarmigan, hare, and waterfowl are taken in the fall months ▪ Black bear, porcupine, and squirrel are taken when available ▪ Traps and snares are set in the winter months ▪ Fish are caught in the summer or through the ice during winter. ▪ Berries, edible plants, firewood are collected during the summer and early fall. ▪ 91 percent of harvest is mammals or fish, both equally contributing to the total. ▪ Edible plants harvest is higher than regional pattern ▪ 87 percent of households receive wild foods from other households in the community
Tanacross ▪ South Bank of Tanana River ▪ 12 Miles NW of Tok ▪ On Alaska highway	▪ 140 residents ▪ 126 residents (90 percent) are all or part Native	▪ Largely subsistence based ▪ Low wages / high unemployment ▪ Many adults work seasonally ▪ 24 of 115 adults employed ▪ 32 adults seeking work ▪ Half of available jobs in the fields of education, health, or social services	▪ EMT-I (1) ▪ Fire service: none ▪ Tanacross Village Health Clinic ▪ No troopers	▪ 96 percent of households report harvesting, using, and receiving subsistence resources (1987) ▪ Moose are harvested in September, sometimes in summer ▪ Caribou are primarily hunted from August to September ▪ Tanacross hunters do not intentionally take bear unless necessary ▪ Porcupine are taken infrequently in summer are fall when encountered by chance ▪ Traplines run from January through March. ▪ Freshwater fishing occurs primarily in June and July ▪ Plants and berries are harvested April through September ▪ Moose and whitefish account for 82 percent of harvest (1987) ▪ Moose is the most sought after resource (93 percent of residents) (1984)

Geographic Location	Demographics / Ethnicity	Economy / Employment	Public Protection	Subsistence Characteristics
				▪ 63 percent of households surveyed in 1987 shared a portion of their subsistence intake with other households ▪ 96 percent reported receiving distributed subsistence harvest
Tok ▪ 205 miles SE of Fairbanks ▪ 93 miles from Canadian border ▪ Located at junction of Alaska Highway and Tok Cutoff	▪ 1,393 residents ▪ 265 residents (19 percent) are all or part Native ▪ Mostly Caucasian community	▪ Tok is a transportation hub ▪ Regional service and supply center ▪ Total potential work force of 995, with 518 employed. ▪ 98 percent of jobs are civilian ▪ Limited year-round work	▪ EMT-1 I (2); EMT-I (7); EMT-II (3); EMT-III (8); EMT-INST (1) ▪ Fire service: 19 volunteers ▪ 3 pumpers, 1 brush, 2 tenders, 1 special ▪ Tok Community Clinic, Tok Health Center ▪ Tok State Troopers Post: 4 troopers in coverage area ▪ 40 Mile Air medivac	▪ 94 percent of residents report using subsistence resources in 1987 ▪ 84 percent actively engaged in subsistence activities ▪ Per capita consumption of land mammals and fish both very close at around 70 lbs ▪ Moose, caribou and Dall Sheep are hunted in August and September and caribou continue to be hunted through December ▪ Black bear are taken in April through September ▪ Most furbearer trapping occurs from November through February ▪ Freshwater fish are harvested year round ▪ Many travel to Copper River for salmon, which makes up 33 percent of total wild resource harvest. (1987) ▪ Land mammals constituted almost half of wild resources harvested ▪ Salmon make up ¼ of the subsistence harvest ▪ 80 percent of households report receiving subsistence resources, with 29 percent identified as sharing those resources.
Tetlin ▪ 20 miles SE of Tok ▪ 15 miles S of Tetlin Junction ▪ On the Tetlin River	▪ 117 residents ▪ 114 residents (97 percent) are all or part Native	▪ Mixed subsistence and cash economy ▪ Strong dependence on wild food harvest ▪ Elder benefits pay for family gas, ammunition, and equipment for harvesting foods ▪ 17 wage jobs reported ▪ 48 percent of employment is with local government	N/A	▪ All surveyed homes used subsistence resources with 90 percent claiming they were directly involved in harvesting activities ▪ Moose hunting is concentrated in late summer and early fall ▪ Caribou do not play a significant role in the Tetlin subsistence cycle ▪ Fur trapping occurs when there is good snow cover ▪ Grouse, ptarmigan and hare are hunted throughout the year ▪ Most waterfowl are taken in the fall ▪ Residents rely heavily of whitefish, salmon do not reach the upper portion of the Tanana River ▪ Fish (mostly freshwater) make up over half (59 percent) of the overall subsistence harvest ▪ Land mammals account for 36 percent of the total harvest ▪ The majority of households (89.7 percent) report receiving wild foods from others, with nearly as many (79.3 percent) sharing their harvest with others

Geographic Location	Demographics / Ethnicity	Economy / Employment	Public Protection	Subsistence Characteristics
Northway Area ▪ 3 disbursed settlements ▪ Native village is located 2 miles N of airport ▪ Northway is located at the airport ▪ Northway Junction is located on the Alaska Highway. ▪ 50 miles SE of Tok	▪ 274 residents ▪ 216 residents (79 percent) are all or part Native	▪ Community has a broad base ▪ Wage employment more available here than in other small communities ▪ Subsistence harvest very important – especially to the Native village ▪ 92 wage jobs ▪ 52 government jobs	▪ Northway First Responder Service: EMT-I (1), EMT-II (2) ▪ Fire service: 21 volunteers ▪ 1 pumper, 1 brush ▪ Northway Clinic at Native village ▪ Northway Troopers Post: 2 troopers in coverage area	▪ All households report using subsistence resources with over 95 percent reporting they were directly involved in the harvest ▪ Per capita consumption of 278 pounds – highest in Upper Tanana ▪ Moose is primarily hunted in the fall. Caribou is primarily hunted in the winter. Both are hunted year-round if necessary ▪ Sheep are occasionally hunted during August and September ▪ Bear are only hunted out of necessity (nuisance or bothersome) ▪ Trapping areas are extensive around Northway. Trapping takes place from November through March ▪ Ducks, geese and cranes are taken in the fall ▪ Freshwater fish are harvested year round, salmon in summer only ▪ Fishing produced more than half (51 percent) of subsistence resources used by Northway residents (1987) – mostly non-salmon species ▪ Land mammals accounted for 43 percent of the harvest ▪ 60 percent of households report sharing some part of their harvest with other residents. 93 percent received wild food from subsistence harvest

Source: Northern Land Use Research, Inc., 2000, 2004; Information Insights, 2004.

Appendix D: Subsistence Harvest Area Maps

Source: TAPS ROW Map Atlas, http://tapseis.anl.gov/documents/eis/ds_maptoc.cfm

Figure 34: Subsistence harvest areas for communities within the TAPS corridor.

Appendix E: Acronyms Used

ADA	Americans with Disabilities Act
ADFG	Alaska Department of Fish and Game
ADNR	Department of Natural Resources
AEWC	Alaska Eskimo Whaling Commission
AGPA	Alaska Gas Port Authority
AHS	Alaska Highway System
AIDEA	Alaska Industrial Development and Export Authority
ANCILA	Alaska National Interest Lands Conservation Act
ANCSA	Alaska Native Claims Settlement Act
ANWR	Arctic National Wildlife Refuge
AS	Alaska Statute
ASRC	Arctic Slope Regional Corporation
AST	Alaska State Troopers
AWIB	Alaska Workforce Investment Board
Bcf	billion cubic feet
BIA	Bureau of Indian Affairs
CIP	Capital Improvement Program
CPI	Consumer Price Index
DCF	discounted cash flow
DOLWD	Department of Labor and Workforce Development
DOR	Department of Revenue
DOT	Department of Transportation
DPS	Department of Public Safety
EIA	Economic Impact Analysis
EIS	Environmental Impact Statement
EMS	Emergency Medical Services
EO	executive order
EPA	Environmental Protection Agency
FNSB	Fairbanks North Star Borough
FHWA	Federal Highway Administration
FMUS	Fairbanks Municipal Utilities System
FNSB	Fairbanks North Star Borough
FTA	Federal Transit Authority
GIS	Geographic Information Systems
GMU	Game Management Unit
GTP	gas treatment plant
GVEA	Golden Valley Electric Association
IHLC	Inupiat History Language and Culture Commission
IMPLAN	IMpact analysis for PLANing
IWC	International Whaling Commission
KPB	Kenai Peninsula Borough
LBC	Local Boundary Commission
MAG	Municipal Advisory Group

MMS	Minerals Management Service
MPA	Metropolitan Planning Area
NEPA	National Environmental Policy Act
NGL	natural gas liquids
NLUR	Northern Land Use Research
NOAA	National Oceanic and Atmospheric Administration
NPR-A	National Petroleum Reserve – Alaska
NRC	National Research Council
NSB	North Slope Borough
PILT	payment in lieu of taxes
RCN	replacement cost new
RCNLD	replacement cost new less deprecation
RIIP	Rural Impact Information Program
ROW	right of way
SGDA	Stranded Gas Development Act
STEP	State Training and Employment Program
STIP	State Transportation Investment Plan
TAPS	Trans Alaska Pipeline System
Tcf	trillion cubic feet
USGS	United States Geological Service
VPSO	Village Public Safety Officer
WACC	weighted average cost of capital
WIC	Women, Infants, and Children