DELTA JUNCTION INDUSTRIAL PARK FEASIBILITY STUDY

Prepared for the

City of Delta Junction

and ASCG, Inc.

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Abbreviations

ADEC	Alaska Department of Environmental Conservation
ADOL	Alaska Department of Labor
ADOR	Alaska Department of Revenue
AIDEA	Alaska Industrial Development and Export Authority
ARRC	Alaska Railroad Corporation
ASRC	Arctic Slope Regional Corporation
BP	British Petroleum
bpd	barrels per day
BRAC	Base Realignment and Closure
CEPA	Canadian Environmental Protect Act
DCED	Alaska Department of Commerce and Economic Development
DNR	Alaska Department of Natural Resources
DoD	U.S. Department of Defense
DOLWD	Alaska Department of Labor and Workforce Development
EDC	Economic Development Conveyance
EPA	U.S. Environmental Protection Agency
FAA	Federal Aviation Administration
GVEA	Golden Valley Electric Association, Inc.
mbf	thousand board feet
mcf	thousand cubic feet
mmbf	million board feet
NMD	National Missile Defense
OPIS	Oil Price Information Service
ppm	parts per million
U.S.C.	United States Code
USDA	U.S. Department of Agriculture

Executive Summary

Delta Junction is approximately 5 miles north of Fort Greely, a military base operated by the U.S. Army. The base is undergoing realignment, which is scheduled for completion by July 2001 in accordance the Defense Base Closure and Realignment Act of 1990 and its amendments. To ameliorate the effects of the base realignment, the City of Delta Junction is considering development of an industrial park. The park could be situated at Fort Greely or on other land that could be purchased specifically for industrial park uses.

This study was prepared by Northern Economics, Inc., a consulting firm in Anchorage, Alaska, for the City of Delta Junction to analyze the feasibility of the development of the industrial park. The study is intended to provide the City with information about economic development opportunities in the area. Under base realignment law, portions of military bases deemed surplus might be conveyed to local redevelopment authorities as Economic Development Conveyances (EDCs). This study may be used to support the application of the local redevelopment authority for an EDC of portions of the Fort Greely.

The report examines various potential industrial park tenants proposed by the City or other proponents, including the following:

- A **topping plant or petroleum refinery** that would produce No. 1 diesel, No. 2 diesel, JP4 and JP8 jet fuels, kerosene, naphtha, and propane
- **National Missile Defense (NMD) related activity** including high technology to support NMD operations and NMD employees
- **Mining-related activity**, including staging areas for the provision of a mine and housing for mine employees
- **Prison-related activity**, including the storage areas and housing for prison employees
- Vegetable processing facilities
- Forest products processing facilities

The study concludes that the City should actively recruit economic activity to the community. Recruitment activity should be targeted to industries capable of using available resources, including facilities at Fort Greely that are subject to realignment. The City should maintain close contact with those interests that have expressed an interest in bringing economic development activities to the community.

City ownership of an industrial park would create substantial risk of liability for the City. If the City decides to pursue the development of an industrial park, care should be taken to limit potential liability. Long-term commitments should be obtained from tenants before the development of the park. The City should avoid direct involvement in capital-intensive development. All environmental hazards should be removed from realigned properties prior to use by tenants.

A small refinery or topping plant (20,000 barrels per day throughput) could be economically viable at current feedstock prices, product market prices, and design production levels and specifications. The target market for refined products is small and competitive. To minimize risk the developer of a refinery should establish relationships with one or more wholesale distributors or retail outlets before development of the plant. The developer should also consider a smaller plant more suitable to the size of the target market. Market prices and demands for product outputs may be expected to fluctuate greatly due to competitor responses. Changes in environmental regulations in the target

market may also require the refinery to add costly capital equipment that seriously threatens the economic viability of the plant. Introduction of a substitute heating fuel to the target market by development of a natural gas pipeline also poses a significant threat to the viability of the plant.

The use of an industrial park to support NMD-related activity should be cautiously pursued by the City. The development of NMD is uncertain because of the political nature of the project. The development of facilities to support this activity is therefore subject to high risk. High cost facilities will be necessary to support the project's technology requirements increasing the risk of development related to NMD.

Teck Resources, Inc. is considering developing a gold mine north of Delta Junction. Teck could develop a staging area in Delta Junction to support its mining activities. Allen Army Airfield could be used during the development of the mine and, if a winter road option is chosen, during the mining operations. Teck, however, has already expressed its preference for development of an all-weather road to serve the mine. An all-weather road could obviate much of the need for staging in the City of Delta Junction. Before development of such a road, the City could provide support facilities for the mine and its employees, but there is a risk that the company will elect to locate staging much closer to the mine once the road is completed. The City should maintain close contact with the Teck Resources to maximize the role of Delta Junction in development of the mine.

Vegetable processing and forest products processing facilities could occupy a portion of the industrial park. Either of these industries would benefit from the provision of waste heat by a refinery. Both of these industries have economic potential but face challenges. Vegetables typically produced in Alaska, such as cabbage, carrots, and potatoes, are reported to be in excess supply. A vegetable processor should therefore focus on products not typically produced in Alaska. Waste heat could be used to heat greenhouses or hothouses to facilitate this production. A large forest products processing facility would likely find the existing transportation infrastructure inadequate for delivery of its products to markets. Smaller forest products processing facilities that produce high value added products from high-quality inputs are likely to find great competition for the area's limited high-quality inputs.

Base realignment at Fort Greely has had a great effect on the City of Delta Junction. The City will have limited ability to influence on large-scale development in the area. The area, however, is not without resources to attract economic activity. To maximize economic development the City should first pursue industries that have already expressed an interest in locating in the area. In addition, the City should market and advertise its resources (including the resources at Fort Greely) to select industries that are likely to have the greatest use for those resources.

1 Introduction

This study was prepared for the City of Delta Junction (the City) by Northern Economics, Inc., to analyze the feasibility of developing an industrial park. The study also is intended to provide the City with information about economic development opportunities in the area.

Delta Junction is approximately 5 miles north of Fort Greely, a military base operated by the U.S. Army. The base is undergoing realignment, which is scheduled for completion by July 2001 in accordance with the Defense Base Closure and Act Realignment of 1990 and subsequent amendments to that act. The office that administers activities under this act is called the Base Realignment and Closure (BRAC) office. To ameliorate effects of realignment, the City is considering development of an industrial park. The park could be situated at Fort Greely or on other land that could be purchased specifically for industrial park uses. Under BRAC, portions of military bases deemed surplus may be conveyed to local redevelopment authorities as Economic Development Conveyances (EDCs). This study may be used to support an application by the City of Delta Junction to the U.S. Department of Defense (DoD), Office of Economic Adjustment, for an EDC of certain portions of Fort Greely. [1]

The report examines various potential tenants proposed by the City or other proponents. The report also examines the various on-base and off-base sites that the City has proposed for the park. The analysis considers various factors, such as the present economy in the Delta Junction area and the various markets that could be served by the tenants of the industrial park. In addition, the report discusses the potential influence of various changes that may occur in the Delta Junction area that are likely to influence the local economy and markets that could be served by the tenants of the industrial park. Some of those influences also are discussed as potential industrial park tenants.

This study evaluates the feasibility of each potential tenant, and considers potential influences of each on the others, as well as complementary and conflicting activities. Since several sites are under consideration, the analysis considers the degree to which potential tenants could minimize conflicts and maximize complementary benefits if one site or more than one site is chosen. The analysis concludes by developing recommendations for actions that the City could take and discussing the likelihood of success for these options.

1.1 Report Organization

- The remainder of this section briefly describes the background and context of this study. A brief description of the City of Delta Junction and the Delta area is followed by a list of potential industrial park, tenants, a brief description of possible sites, and a list of possible changes in the community (community development influences) that are likely to affect the success of the park.
- Section 2 is a more complete description of the various sites that could be used for the industrial park. The section briefly describes some of the advantages and disadvantages of the various sites.
- Section 3 briefly describes each of the different community development influences. These descriptions provide the background necessary for analyzing the effects of each of these influences on the industrial park and its potential tenants later in the study.

[1] The DoD is tasked with disposing of all property deemed surplus due to the realignment of military bases. To mitigate the effects on local economies of base realignments, if certain criteria are satisfied, the DoD is permitted to convey surplus properties to Implementation Local Redevelopment Authorities for economic development purposes. These conveyances can be made without any financial consideration.

- Section 4 analyzes the economic feasibility of each potential industrial park tenant. The analysis differs for each potential tenant, depending on availability of information about the tenant and the depth of analysis required to reach conclusions about the feasibility of the tenant. At the end of the analysis of each potential tenant, conclusions and recommendations are set out.
- Section 5 sets out conclusions and recommendations derived from the analysis.

1.2 Community Description

Delta Junction is a city on the east bank of the Delta River, south of the river's convergence with the Tanana River. The Richardson Highway connects the city with Fairbanks, 95 miles to the northwest, and Valdez, 270 miles to the south. Delta Junction is at the terminus of the Alaska Highway, by which Whitehorse can be accessed, approximately 500 miles to the southeast. The city is in the Southeast Fairbanks Census Area. The Trans-Alaska Pipeline passes through Delta Junction, and a major pump station for the pipeline (Pump Station No. 9) is approximately 10 miles south of the city along the Richardson Highway. The study area location is shown in Figure 1-1. Sites studied for this report are shown in Figure 1-2.

The incorporated City has 889 residents. The study area is better defined by the region surrounding the City. The best-defined area for which population figures are available is the Delta Area School District, which has 4,108 residents.

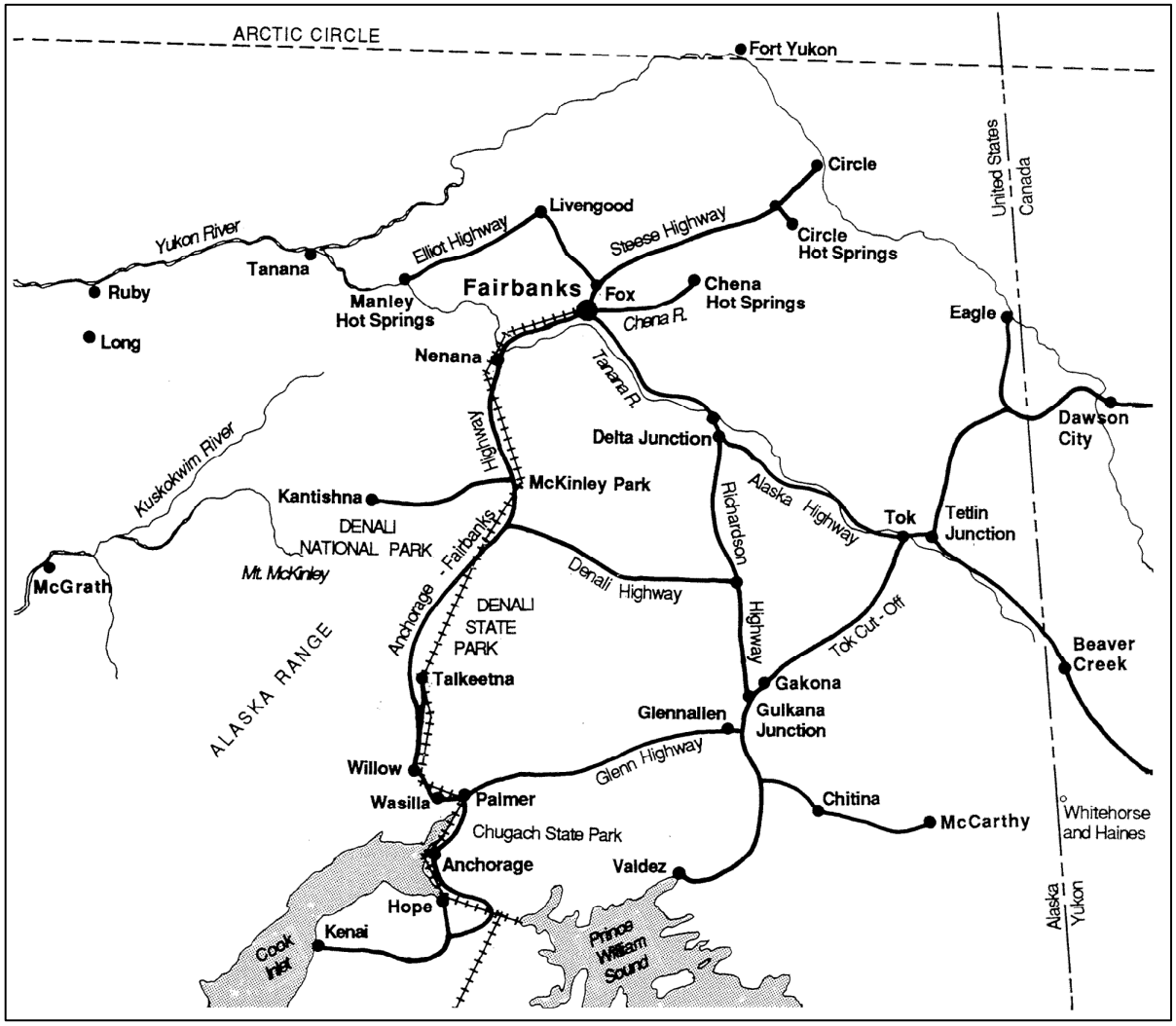
In recent years, the community's economy has relied heavily on Fort Greely. Approximately half of the jobs in the community were related directly to Fort Greely in 1995 when the federal government announced that the base would be realigned beginning in 1997. Under realignment, the Army intends to continue to use Fort Greely and some of the facilities at the base for its Cold Region Test Center and Northern Warfare Training Center. Farming is also prominent in Delta Junction. The state government has supported agricultural development with land sales, marketing programs, and creation of a bison range. Farms in the area currently produce grain, dairy products, vegetables, cattle, and hogs (Alaska Community Database).[2]

The number of military personnel stationed at Fort Greely and the number of base civilian employees will be reduced substantially by the realignment, but could increase if the military decides to use the base for initial deployment of the National Missile Defense (NMD) program. The Alaska Department of Labor (ADOL) estimated that before realignment, employment related to the base (both civilian employees and contract employees) constituted more than 50 percent of Delta area employment (ADOL, 1995). Military personnel at the base declined from 447 in 1990 to approximately 267 in July 1999. Population related to the base also declined—the number of military personnel and their dependents dropped from 1,207 in 1990 to 612 in July 1999 (Alaska Department of Labor and Workforce Development (DOLWD), formerly ADOL, 1999). The decline is scheduled to continue—the military anticipates that the base will employ only 11 military personnel and 55 civilians at the completion of realignment in 2001 (Anderson, 2000). The Northern Warfare Training Center and the Cold Regions Testing Center at Bolio Lake, however, may require additional personnel. These additional positions could raise the total military employment in the area to between 75 and 100 persons. The extent of reductions is also uncertain because of the possibility of the NMD deployment occurring at Fort Greely. This deployment has the potential to return base personnel to levels that existed before the realignment (Anderson, 2000).

[2] Since Delta Junction is in an unincorporated borough, the areas for which statistics are gathered are not always consistently defined. Comparison of statistics from different sources is therefore not advisable.

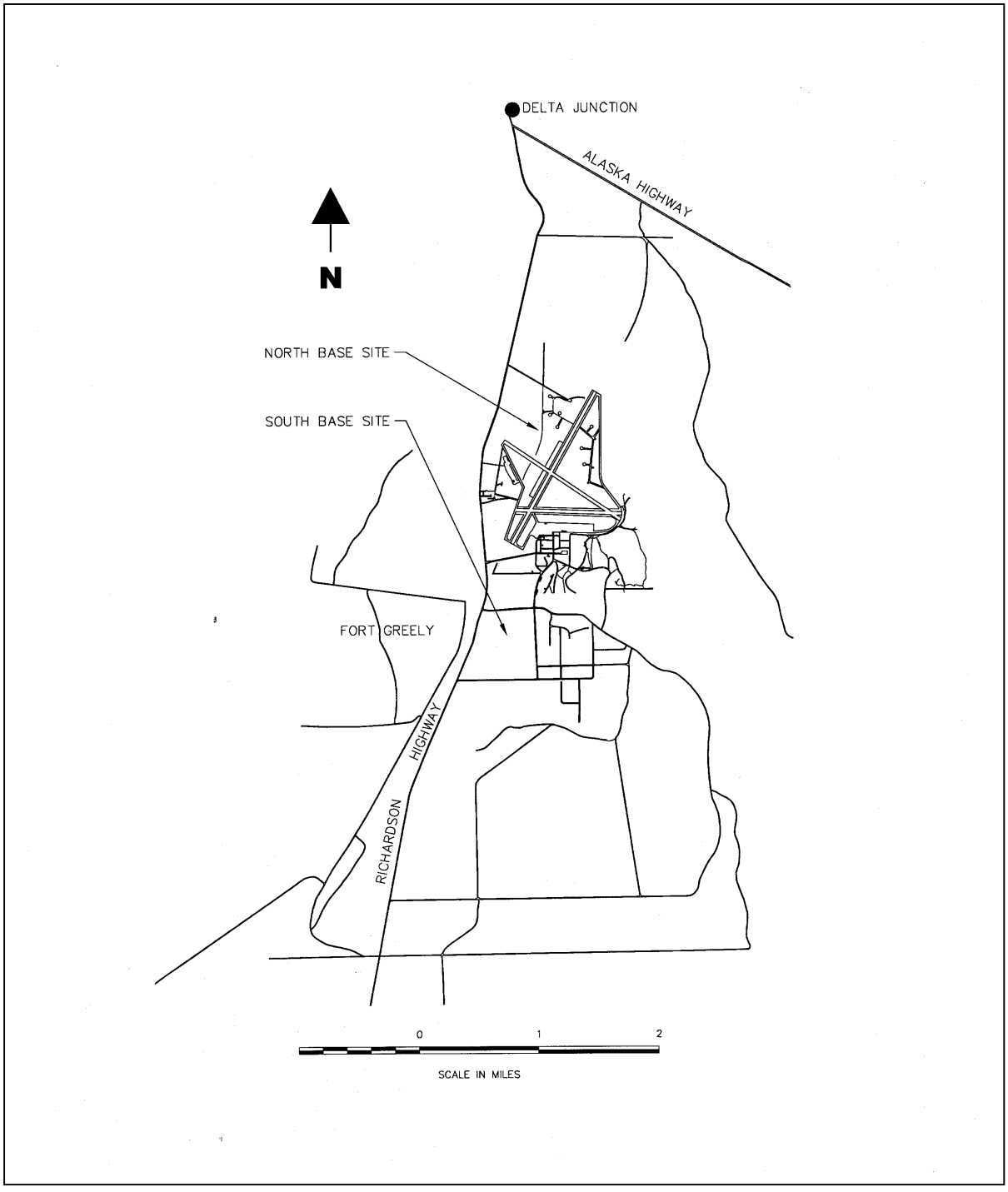
Although changes at Fort Greely have had an impact on the community, the area's population has changed only slightly in recent years. In the last 10 years, the school district population has fluctuated, growing steadily from 4,029 persons in 1990 and to 4,262 in 1995. Since 1995, the population has fluctuated erratically, reaching 4,108 in 1999, its lowest level since 1993. Although somewhat unstable, population changes have moved within a band of less than 6 percent. Similarly, Delta area employment has remained relatively steady, fluctuating between 871 persons in 1995 and 928 persons in 1998. Figure 1-3 illustrates population in the City of Delta Junction, at Fort Greely, and in the Delta Area School District, which includes both the City and Fort Greely (DOLWD, 1999).

Figure 1-1. Study Area Location Map



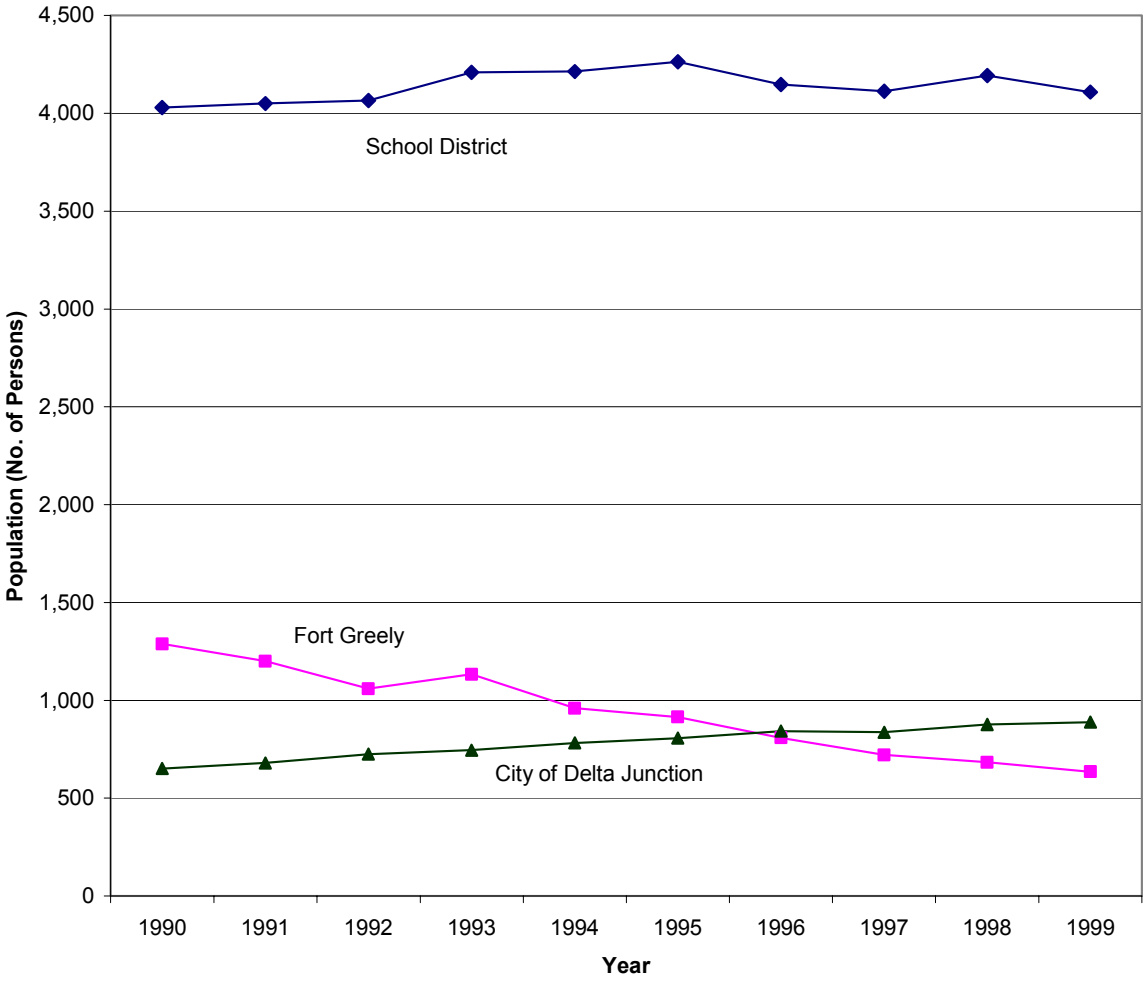
Source: ASCG, Inc., June 2000.

Figure 1-2. Site Map



Source: ASCG, Inc., November 2000.

Figure 1-3. Delta Junction Area Population, 1990-1999



1.3 Potential Industrial Park Uses

The City has suggested the inclusion of several different facilities in the industrial park. These potential tenants include:

- A **topping plant** or petroleum refinery that would produce No. 1 diesel, No. 2 diesel, JP4 and JP8 jet fuels, kerosene, naphtha, and propane
- **NMD-related activity** including high technology to support NMD operations and NMD employees
- **Prison-related activity**, including the storage areas and housing for prison employees
- Vegetable processing facilities
- Forest products processing facilities

The choice of tenants will depend on their feasibility and potential profitability. A tenant's success is likely to be influenced by its interaction with other tenants. Since certain tenant facilities are likely to complement one another, design of the park facility and location of the different tenants are critical to exploiting these benefits. Some development prospects may conflict with each other. Consequently, the City is considering development of more than one site for the activities. Separating conflicting facilities may enable the City to maximize the benefits of the park and its tenants.

1.4 Potential Industrial Park Sites

The City is considering five different sites for the park. Two sites are on the present base at Fort Greely and may be acquired or leased from the Army as part of redevelopment of the base under the base realignment. The other three sites are off base and would be developed independently of base realignment. The City or an alternative developer of the industrial park would purchase these lands through the local real estate market.

1.5 Potential Community Development Influences

The community has several prospective activities that may influence the choice and success of potential tenants of the industrial park. These include the following:

- The DoD is considering locating the **NMD System** (NMD) in the area currently occupied by Fort Greely.
- Teck Resources, Inc., is considering development of the **Pogo project**, a gold mining operation near Pogo Creek, approximately 35 miles northeast of Delta Junction. The possible construction of an all-season road or a winter road to support the mine will affect the mine's influence on economic activity in Delta Junction.
- Several groups are considering development of a **natural gas pipeline** from the North Slope to existing pipelines in Canada.
- The **Alaska Railroad** may be extended southeast from its present terminus at Eielson Air Force Base to Delta Junction (or beyond to Canada).
- A **medium security prison** may be located in a part of the facilities of Fort Greely.
- **Base housing facilities at Fort Greely** may be converted to civilian uses, in support of other uses at the base or as independent housing.
- Golden Valley Electric Association (GVEA) is considering developing **fiber optic communication** service to the Delta Junction area.

2 Industrial Park Sites

The City is considering five different sites for the development of the industrial park. Two are on the present site of Fort Greely. The other three sites are off base and are being considered both for the economic benefits of the particular site and the potential constraints on development on the base, particularly in the area of the Allen Airfield. This section describes each of the different possible sites for the industrial park. After the description of each site, the merits of each site are briefly discussed.

2.1 On-Base Sites

Both base sites have the distinct advantage of proximity to Allen Army Airfield and base facilities. Airfield users and the Army are potential markets for fuel from the topping plant. These sites also provide easy access to facilities for air and truck shipment of goods from other facilities in the park. The advantage of being the exchange point for shipments using both modes should not be overlooked.

The City hopes to obtain on base property at no cost or for little consideration. The south base site may be surplus base property, which could be conveyed to the City under a no-cost EDC from the DoD. The north property, adjacent to the Allen Army Airfield, might be leased for nominal consideration. In the event that the site must be acquired for more than nominal consideration, the results and conclusions must be adjusted accordingly.

Both on-base sites provide good airfield access, which would simplify any air shipments of goods to and from the industrial park. Airfield access would not have much effect on the operations of either vegetable or forest products processors that would need to move large quantities of goods to and from the area. Air transport is cost-prohibitive for such large shipments. Airfield access, however, could be important for expedited transport of repair parts for those facilities. Access to the airfield may be beneficial to the prison for transport of prisoners to and from the facility. The mine would also benefit from airfield access, particularly in the early stages of development before road construction has been completed. Equipment could be stored at the industrial park and flown to and from the mine as needed. Personnel could be housed in the existing base housing with easy access to air transport to and from the mine. This benefit will be lost almost entirely if an all-season road is opened.

If services of the industrial park are to be used by NMD, the best location for the park is on base. However, sites on base may conflict with the continuing use of the base by the Army and with other uses under consideration for the base. In addition, the FAA could determine that the operation of a topping plant (or other industrial park uses) may interfere with airfield runway use. The existence of a conflict is highly case-dependent in relation to usage specifics including stack height and emissions levels and the location of the facility relative to intended flight paths. The conflict will be determined in the context of a specific plan (Freeman, 2000). If the topping plant is to be developed, further discussions should be undertaken with the FAA before precluding any site from development.

2.1.1 North Base Site

One potential site for the industrial park is an area north of the intersection of runways 18/36 and 9/27 at Allen Army Airfield. The area available for development here is likely to be of limited to acreage. This is the best site for interaction between air and road transport since it abuts the airstrip. The site also appears to be advantageous for the direct access it provides to the Trans-Alaska pipeline, the intended source of crude oil for the topping plant.

This site, however, is problematic for the development of the topping plant because of the ownership of the land. The Army does not intend to sell the property in the area of airfield, so the conveyance of land in this area would be by lease. Except in limited circumstances, the law currently prohibits the storage of hazardous materials that are not owned by the DoD or a member of the armed forces on DoD lands (Chapter 10, Section 2692 of the U.S. Code [10 USC 2692]). This circumstance could prohibit or complicate development of either the topping plant or another industrial use that uses significant amounts of hazardous materials, such as production of various types of forest products, at the north on-base site or on other leased property.

2.1.2 South Base Site

The other on-base site proposed for the industrial park is south of Allen Army Airfield on surplus property. This area is part of the present base facilities at Fort Greely and may use some of the buildings in the main cantonment area of Fort Greely. Use of this site for the park may save on building construction costs for some of the supporting uses. This site also has the advantage of relying on the developed infrastructure at the base. Road facilities are intact. The provision of utilities may be eased by the existing utilities at the base, although those facilities could be more expensive to operate than newer, more efficient systems. The south base site also provides good access to the pipeline in connection with the development of a topping plant. This access would limit the need to construct secondary piping to provide supplies of crude oil to the plant and return unprocessed oil to the pipeline.

This site, however, is not without complications:

- Use of buildings in the present area of Fort Greely will require some negotiation and agreement with the Army. The Army intends to continue to use several of the buildings. Consequently, the use of buildings must be first negotiated as part of the base realignment process.
- This site is located off the end of runway 18/36. Proximity to the flight paths will compel the FAA to deny a permit for development of a topping plant, a vegetable processing plant, or a forest product processing plant, if those facilities or vapor plumes or ice fog that they generate are found to interfere with aircraft approaches. For a topping plant, this complication is exacerbated by the track of the pipeline through the area. The locations with the best access to the pipeline also are the most inline with aircraft flight paths.[3] This problem could make this location unusable for the industrial park. Further discussions with the FAA must be undertaken if development of this site is to be pursued.
- Two of the facilities considering locating in the Delta Junction area (NMD and the prison) may use some of the facilities in the main part of the cantonment. These uses may conflict with the use of this area for other industrial park uses, particularly for the topping plant.
- Surplus property conveyed to the City is subject to a requirement that all proceeds from use of the property in the first 7 years be reinvested in the property. This requirement is not applicable to leased property, such as the north on-base site.

2.2 Off-Base Sites

Three sites under consideration are off base. These sites have the advantage of avoiding conflicts with existing and potential on-base uses such as the prison or NMD. The sites also would avoid any

[3] This site is on land that could be conveyed from the Army to the local redevelopment authority, so the prohibition of storage of hazardous materials on DoD property is not applicable to this site.

difficulties that might arise due to conveyance of the property under a military transfer. The 7-year reinvestment requirement applicable to the south on-base site would not apply to an off-base site.

The off-base sites also avoid any FAA restrictions on development in proximity to the airfield. The off-base locations, however, may sacrifice the advantage of proximity to shipping services at the airfield. The potential markets for the industrial park products, particularly fuel produced by the topping plant, may be reduced. In addition, the potential park tenants that would benefit from airfield access (particularly the mine and the prison) would find the park less attractive. The good road access at all of the off-base sites would continue to be attractive to potential tenants that require lower-cost truck transport at their facilities. These potential tenants include the topping plant, the vegetable processor, and the forest products processor.

The use of an off-base site, however, is complicated since off-base sites must be purchased in the open market. A suitable, available site must be found for the park. The purchase must be funded. To operate the topping plant and to maintain adequate storage at the site, approximately 25 acres of land is required (Stanley, 2000). To develop additional facilities in the area of the topping plant will require additional acreage, the extent of which will depend on the use. In the present market, bare land is generally available for less than $1,000 per acre (Barger, 2000). The land required for development of the topping plant and additional supporting and related uses should therefore be expected to cost the City between $25,000 and $100,000, depending on the uses undertaken.

Currently, a parcel of 77 acres south of and contiguous to the property of Pump Station No. 9 is listed on the market for $54,000 (or $700 per acre) (Barger, 2000.)

2.2.1 Site South of Delta Junction Along the Richardson Highway near Pump Station No. 9

One off-base site being considered for the industrial park is south of the main cantonment at Fort Greely, along the Richardson Highway, in the area of Pump Station No. 9 of the Trans-Alaska Pipeline. This area provides the benefit of being close to the pipeline, the source for crude for the refinery. In addition, proximity to Pump Station No. 9 may reduce the cost of connecting to the pipeline and facilitate low-cost sales of outputs to Alyeska for pump station operations (Ringwald, 2000). The site also has good road access to the base facilities and could be used to support functions at the base.

2.2.2 Site North of Delta Junction Along the Richardson Highway

Another off-base site for the industrial park could be along the Richardson Highway north of Delta Junction. This location is not well defined at this stage. The site could be chosen for its access to the Trans-Alaska pipeline and for its proximity to any road that is constructed to serve the Pogo mine. This is the only off-base site that is likely to attract the mine as a tenant. The site would still have reasonably good access to the pipeline that would be beneficial to the topping plant. If a site in this area is selected, care should be taken to choose a location where the pipeline is aboveground, since that could reduce the cost of pipeline access significantly. The site would also have good road access, which is important to the topping plant, the vegetable processor, and the forest products processor.

2.2.3 Site South of Delta Junction Along the Alaska Highway

A possible off-base site is an area of land along the Alaska Highway south of Delta Junction. This site would provide access to any future rail extension into Canada and possibly to a natural gas pipeline constructed parallel to the Alaska Highway. Since both the railroad extension and the natural gas pipeline are in the early stages of planning, these benefits are very speculative. This site is the only site

under consideration that is not close to the Trans-Alaska pipeline. This site has a distinct disadvantage of not having an easy supply of crude for the refinery.

3 Potential Community Development Influences

This section describes each of the potential community development activities. The section does not attempt to analyze fully the influence of each development on the community or the industrial park, but rather lays the groundwork for further discussion and analysis of the influence of the different developments on the potential tenants of the industrial park, which is undertaken in the analysis of the different potential tenants in Section 4.

Prospective activities that may influence the choice and success of potential tenants of the industrial park include the following:

- The DoD is considering locating the **NMD System** in the area currently occupied by Fort Greely.
- Teck Resources, Inc. is considering the development of the **Pogo project**, a gold mining operation near Pogo Creek, approximately 35 miles northeast of Delta Junction. Whether an all-season road or a winter road is developed to support the mine will also affect the influence of the mine on economic activity in Delta Junction.
- Several groups are considering the development of a **natural gas pipeline** from the North Slope to existing pipelines in Canada. In addition, natural gas exploration is ongoing in the Delta area. Development stemming from this exploration could also influence the area.
- The **Alaska Railroad** may be extended southeast from its present terminus at Eielson Air Force Base to Delta Junction (or beyond to Canada).
- A **medium security prison** may be located in a part of the facilities of Fort Greely.
- **Base housing facilities at Fort Greely** may be converted to civilian uses, in support of other uses at the base or as independent housing.
- GVEA is considering developing **fiber optic communication** service to the Delta Junction area.

The analysis of potential industrial tenants is particularly complicated, since undertaking any of these projects may influence the industrial park in many ways. First, the opening of these facilities may directly influence the success of the industrial park tenants. For example, if the prison opens its heating fuel supply may increase topping plant sales. Second, the opening of one facility may influence whether another of these facilities chooses to open and where, further complicating any projections. For example, NMD may preclude development of a prison at the Fort Greely, as both are projected for development in the same area. NMD development may also influence the development of a natural gas pipeline through the area since it would expand the potential market for gas in the area. Each of these interactions must be explored to some degree in the analysis.

3.1 National Missile Defense System

The government has yet to decide whether to undertake NMD and, if so, whether to site the program at Fort Greely. At this point, the discussion of sites for facilities and support for the program is speculative. The most current speculation is that if NMD is sited at Fort Greely, it will use the area south of the main cantonment for its missile field. Allen Army Airfield may be used for transport of equipment and personnel to and from the site. Air transport would be complemented with road (and possibly rail transport in the long term, if the railroad is extended). NMD could also occupy all or many of the buildings in the main cantonment. The exact usage for facilities is in the planning stages.

If undertaken, NMD development is expected to bring additional activity to the community and may require facilities at Fort Greely or elsewhere in the community. High-technology development is expected in the area of the base and possibly elsewhere. Fuel will be required both on base and at any supporting facilities. Government personnel and personnel of contractors employed to support NMD may be housed in Fort Greely housing. Additional housing facilities are expected to be required at the base or in the Delta area.

3.2 Pogo Project Mine

Teck Resources is planning to apply for permits to begin construction of the Pogo mining project in August 2000. They anticipate obtaining final permits and beginning construction between February and August 2002. The mine would employ 500 persons during development and 300 persons once it is fully operational.

If the mine relies on a winter road for support, Delta Junction could be a staging area for the delivery of truck freight to the mine during the open season of the winter road. A City-owned industrial park is a possible site for this activity. Allen Army Airfield at Fort Greely would also be a staging area for airfreight deliveries to and from the mine during seasonal road closures. The winter road, however, is not favored by Teck because of lack of reliability of weather. In some winters, warm weather would limit the road availability or, in the extreme, prevent construction of the road, requiring more extensive air transport to service the mine. Air transport to the mine is also complicated by weather, as wind and visibility limit the number of days on which air transport is available.

The mine may instead construct an all-season road to service the mine. The all-season road is the preferred alternative of the company. For a fifteen-month period during mine construction, air service to the site from Allen Army Airfield would be required. During this construction phase, supplies and goods would be flown to the mine from the airfield. Once road construction is complete, supply would likely be made by truck removing reliance on Allen Army Airfield at Fort Greely.

3.3 Natural Gas Pipeline

Several plans for the use of natural gas from the North Slope are currently under study. One option is to deliver natural gas to the Canadian and continental U.S. markets through a pipeline across Alaska and Canada. Suggested routes for the pipeline pass through the Delta Junction area into Canada or to Valdez (Ragsdale, 2000; Bradner, 2000; and Loshbaugh, 2000). Development of this pipeline would facilitate provision of natural gas to the Delta area. (Natural gas may compete with other fuel supplies, including supplies from the topping plant.) Although planning of the natural gas pipeline is in the preliminary stages, present indications are that the pipeline will be constructed and will pass through Delta Junction. Federal and state government and industry interests all favor development of the pipeline. Because the success of the industrial park, particularly the topping plant, will be influenced if the pipeline is developed, the analysis considers the implications of a natural gas pipeline through the Delta Junction area.

3.4 Alaska Railroad

The Alaska Railroad parallels the Richardson Highway from Fairbanks to Eielson Air Force Base. At a future date, the railroad may be extended from Eielson through Delta Junction into Canada, providing a connection to other rail systems in Canada and the Lower 48. Funding of a study of the rail extension is under consideration in the U.S. Congress (Bradner, 2000). The project should be expected to take years to plan and construct. Such a rail system, however, could have a large impact

on the Delta Junction area by providing a new transportation mode. Rail service to the area could supply a lower-cost alternative for shipping goods to and from the area, including shipments to and from Fort Greely, and shipments to and from the industrial park.

3.5 Medium Security Prison

A medium security prison has been proposed for the Fort Greely site. The facility would house more than 800 inmates. The State of Alaska has approved a plan for the prison, contingent on the prison utilizing existing buildings at the base. Utilities for these buildings could be supplied by the existing systems at Fort Greely, including steam heat from boilers currently in use at Fort Greely. The prison is likely to bring new residents to the community to support operation of the prison. Some new prison personnel and their families may be housed in apartments scheduled for realignment at Fort Greely. The future of the prison development is uncertain. The City and the company with whom it contracted to operate the facility are currently in litigation about the existence of a management contract. In addition, NMD development at Fort Greely could interfere with operation of the prison at the same location. The current official position of NMD officials is that the two may be able to coexist at the site (Cole, 2000).

Development of the correctional facility would influence Delta Junction by bringing new employment to the area, occupying facilities at the base including on-base residences, and possibly utilizing space in the industrial park. The specific uses of the industrial park by the prison are uncertain. Because of the present litigation, information concerning potential use of industrial park facilities by the prison is largely unavailable and discussion is therefore speculative.

3.6 Reuse of Base Housing

Housing currently used by Fort Greely may be converted to civilian use. This conversion would likely occur in conjunction with another of the potential uses at the base, specifically the prison, the Pogo project, or NMD. The present plan for the prison anticipates housing some prison personnel in the existing base housing. The reuse of the housing is problematic and may be costly. These facilities were painted with lead-based paint and contain asbestos. In any case, the use of these facilities is likely to be complicated by these environmental hazards and must be negotiated prior to the City taking possession of the properties under a conveyance related to the realignment. The housing is currently served by the utility systems at Fort Greely and may be at an economic disadvantage because of the inefficiency of those systems.

3.7 Fiber Optic Communication

GVEA is said to be in the process of extending fiber optic communications into the Delta Junction area. The extension of these services could make the area more suitable for high technology development, which could be used to support other economic development in the community including NMD.

4 Potential Industrial Park Tenants

This section evaluates the economic feasibility of the various potential tenants of the proposed industrial park. In each case, the analysis is tailored to the potential tenant. The analysis of the refinery (Subsection 4.1) is the most comprehensive and includes analyses of the market and the competitive environment, as well as financial and sensitivity analyses.[4] The refinery discussion considers implications of changes in environmental regulations and the competitive situation in fuel markets. The discussions of National Missile Defense related activities, mine-related activities and prison-related activities (subsections 0, 4.3, and 4.4) are much less detailed and analyze the potential relationship between the industrial park and the potential tenant. The analyses of a vegetable processing tenant and a forest products processing tenant analyze the potential markets for processed outputs, the supplies of inputs, and the competitive position of the tenant in these industries. At the end of each section, conclusions are drawn from the analysis and a set of recommendations is enumerated.

4.1 Refinery

The City of Delta Junction is interested in determining the feasibility of a small petroleum refining plant that would be near Delta Junction and capable of producing a limited range of products. These limited facilities are commonly known as topping plants. The proposed topping plant would serve the diesel and heating fuel markets within the southeast Fairbanks area and the Yukon Territory. The area currently is not served by natural gas, and diesel and heating fuel are the primary energy sources.

The population of the Alaska portion of the target market is increasing, while the population of the Canadian portion of the target market is declining. Statewide, the consumption of heating fuel and distillates in Alaska appears to be on the decline. Similarly, in the Yukon Territory, diesel consumption is volatile, but a downward trend in consumption can be seen during the past 10 years.

The annual demand for diesel fuel in the market area is approximately 8 million gallons from Alaska and 15 million gallons from Canada for residential and business use, 1.52 million gallons by the military at Fort Greely, and 18 million gallons for use by Alyeska Pipeline Service Company. Total demand in the target market is approximately 42.52 million gallons per year.

A topping plant of the size proposed for the City would produce approximately 58 million gallons a year of high-sulfur refined product. The City would need to capture the entire targeted market and find markets for the remaining 15.5 million gallons per year of distilled product. A smaller topping plant would produce less fuel, but still would be subject to the competitive forces.

The topping plant proposed would be serving a market already served by competing refineries in Alaska. These refineries enjoy certain competitive advantages due to size of operations and bidding preferences. The high costs to acquire and operate the proposed plant make it sensitive to changes in product sales price and volume.

[4]Sensitivity analysis is used when a number of variables exist that cause uncertainty about the reliability of estimates. The analyst establishes a range for the estimates and uses the outer boundaries of that range to determine the potential effects of changes in variables on the results.

4.1.1 Refinery Feasibility

This subsection describes the proposed plant, discusses the market situation, estimates plant revenues and costs, and analyzes the plant's economic feasibility. The market description is broken down into four segments of buyers. A competitive analysis follows, which discusses location and competing products and suppliers. The financial analysis includes capital and operating costs and income of the plant. The sensitivity analysis examines different financial scenarios that the plant operators may experience. Recommendations are offered that may be helpful if plant proponents opt to proceed.

Information was obtained from fuel distributors serving the proposed market area, the U.S. Army; Ventech Engineering of Pasadena, Texas (a firm specializing in refinery development); British Petroleum; Alyeska Pipeline Service Company; and various agencies of the State of Alaska, government of Canada, and Yukon provincial government.

4.1.2 Refinery Unit

The topping plant under consideration would be capable of producing high-sulfur diesel fuel No. 1, diesel fuel No. 2, jet fuels, kerosene, naphtha, and propane. Ventech Engineering has developed a preliminary plan for the plant on behalf of Big Valley Corporation, a local organization. The plant would obtain crude oil inputs from the Trans-Alaska pipeline. The plant would be capable of processing 20,000 barrels per day of throughput into the various products. The particular output mix could be regulated by the plant. The processing efficiency of the plant would be in the range of 20 to 25 percent conversion, depending on the product mix chosen. The remainder would be residuals that could be returned to the pipeline on payment of a premium.

4.1.3 Refinery Market

4.1.3.1 General Market Description

The target market for the refinery would be home heating and diesel fuel consumers in Southcentral Alaska and northwest Canada not currently served by natural gas. In Alaska, this market would be the area southeast of Fairbanks to the Canadian border. In Canada, the market would be the Yukon Territory. Fuel would be distributed by truck to consumers on the Richardson Highway from Big Delta to Glennallen, on the Alaska Highway from Delta Junction to Whitehorse, on the Tok Cutoff, on the Taylor Highway from Tok to Dawson, and on the Klondike Highway from Whitehorse to Dawson.

The U.S. military has a large presence in the area of Delta Junction, consumes large quantities of fuel, and has distinct fuel purchasing practices. Alyeska Pipeline Service Company also consumes larges quantities of fuel in its operations. Consequently, the market may be separated into four distinct segments: the Alaska fuel market, the Yukon fuel market, the military fuel market, and the demand by Alyeska Pipeline Service Company. These markets are each discussed independently.

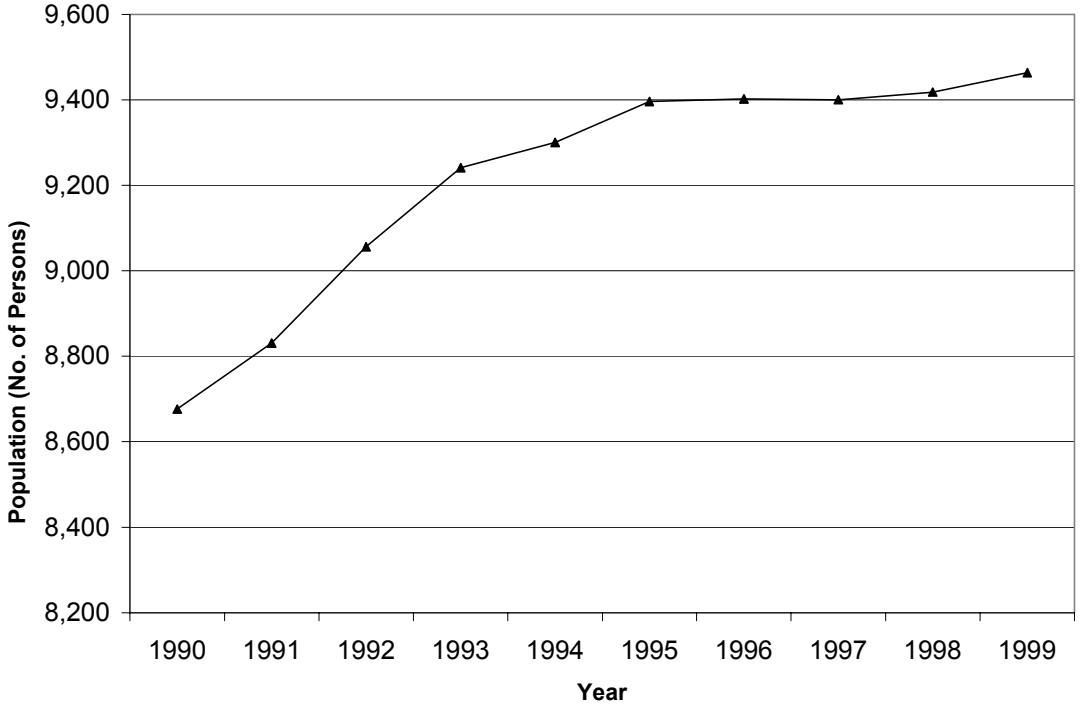
4.1.3.2 Alaska Target Market

The Alaska target market encompasses the Southeast Fairbanks Census Area and the Copper River subarea of the Valdez-Cordova Census Area. The population of this area has steadily increased during the last 10 years. The total increase during that period is approximately 900 people (or 10 percent). Figure 4-1 shows the annual population for the area from 1990 to 1999.

The Alaska Department of Revenue (ADOR) receives monthly reports of sales of highway diesel and heating fuel in Alaska. According to ADOR data, highway diesel and heating fuel consumption

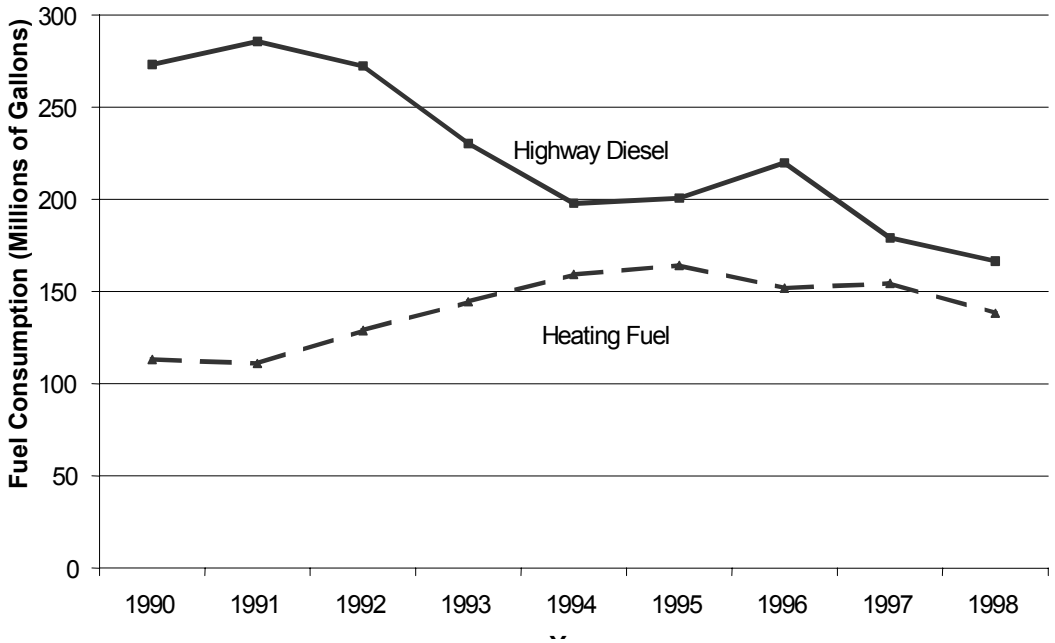
appears to be declining. Figure 4-2 and Table 4-1 show a decline in consumption of highway diesel that is not compensated by the slight rise in heating fuel in the same period.

Figure 4-1. Annual Population of the Southeast Fairbanks Census Area and Copper River Census Subarea of the Valdez-Cordova Census Area, 1990-1999



Source: ADOL, 1999.

Figure 4-2. Highway Diesel and Heating Fuel Consumption in Alaska, 1990-1998



Source: ADOR, 2000.

Table 4-1. Highway Diesel and Heating Fuel Consumption in Alaska, 1990-1998

Year	Fuel Consumption (Millions of Gallons)	
	Highway Diesel	Heating Fuel
1990	273.083	113.159
1991	285.625	110.922
1992	272.294	128.800
1993	230.301	144.387
1994	197.813	159.170
1995	200.591	164.061
1996	219.650	151.795
1997	179.038	154.387
1998	166.562	138.239

Source: ADOR, 2000.

This statewide heating fuel data includes areas of Southcentral Alaska outside the target market that are served by natural gas. Expansion of natural gas service areas in the mid- to late 1990s could account for the statewide decline of heating fuel sales.

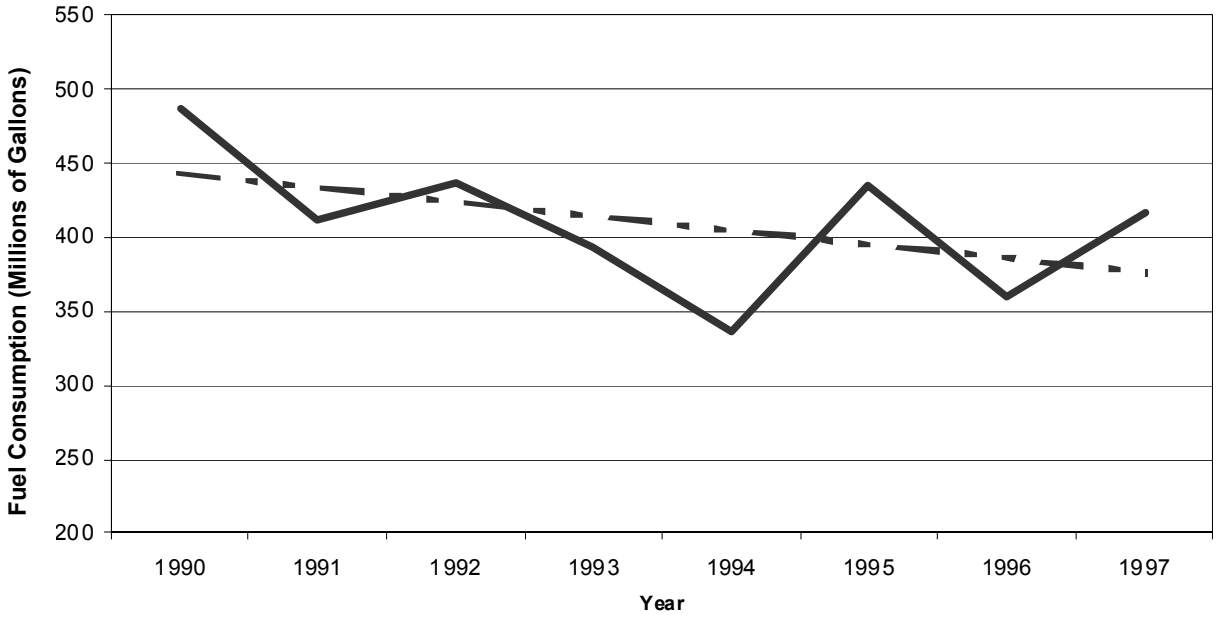
The U.S. Department of Energy (DOE), Energy Information Administration, tracks energy consumption in the United States. DOE-estimated consumption of diesel fuel and fuel oil in Alaska for 1990 to 1997 is shown in Figure 4-3. As defined, diesel fuel and fuel oils do not include motor gasoline, kerosene, jet fuel, aviation gasoline, and other refined petroleum products. The market for diesel fuel and fuel oil appears to be volatile; however, there appears to have been a trend of decreasing consumption for the period.

Approximately 417 million gallons of refined products were consumed statewide in 1997, according to the DOE. For the same year, ADOR reports show that 179 million gallons of diesel were used for highway use and 154 million gallons of heating fuel were consumed in Alaska. Marine use of diesel is thought to account for most of the difference (84 million gallons) between the two estimates.

To gain a better understanding of the Alaska market, distributors were interviewed. In the area southeast of Fairbanks to the Canadian border, distributors purchase fuel from the two refineries at North Pole and transport fuel from the Nikiski refinery. The fuel is hauled by truck to customers throughout the area. Distributors estimate an annual consumption of 8 million gallons per year of diesel fuel, of which 90 percent is used for home heating. Thus, an estimated 7.2 million gallons of heating fuel is consumed annually within the Alaska portion of the target market (Service Oil & Gas, 2000). This total represents per capita consumption of approximately 760 gallons per year.

The potential exists for NMD or Pogo Mine activity to increase population in the Delta Junction area. If these activities are assumed to bring 250 new families to the area, the diesel fuel market could increase slightly. According to the most recent estimates, the average number of persons in Alaska households is 2.68 (DOLWD, 2000). Using this figure, 670 persons would be added to the population. With a per capita fuel consumption of 760 gallons per year, total demand would increase by approximately 0.5 million gallons per year in the Alaska target market. Including this increase, total consumption in the Alaska target market would be approximately 8.5 million gallons.

Figure 4-3. Diesel Fuel Consumed in Alaska, 1990-1997



Source: Energy Information Administration, 2000.

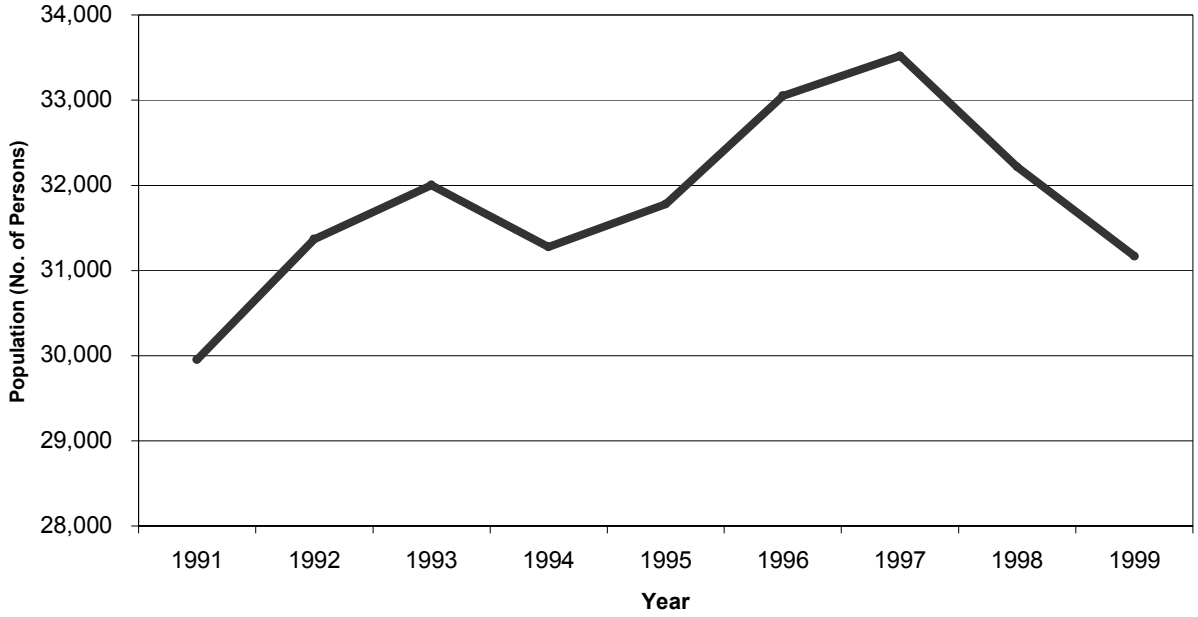
4.1.3.3 Yukon Target Market

The Yukon Territory consumes diesel fuel for heating, power generation, and on-road use. Much of these products come from Alaska. The on-road diesel fuel must comply with Canada's Environmental Protection Act, which requires less than 500 parts per million (ppm) of sulfur content in the fuel. The proposed topping plant would not meet this minimum sulfur requirement. Therefore, the primary market in Canada would be heating and power generation fuel.

In recent years, the population of the Yukon Territory of Canada has been less stable than the population of Alaska. Figure 4-4 shows the annual population of the Yukon for the period from 1991 to 1999. During this period, the Yukon's population has fluctuated, rising from 1991 to 1993 and from 1994 to 1997 and declining otherwise. The decline, approximately 7 percent since 1997, suggests that the market for fuel oil in the Yukon may be weakening.

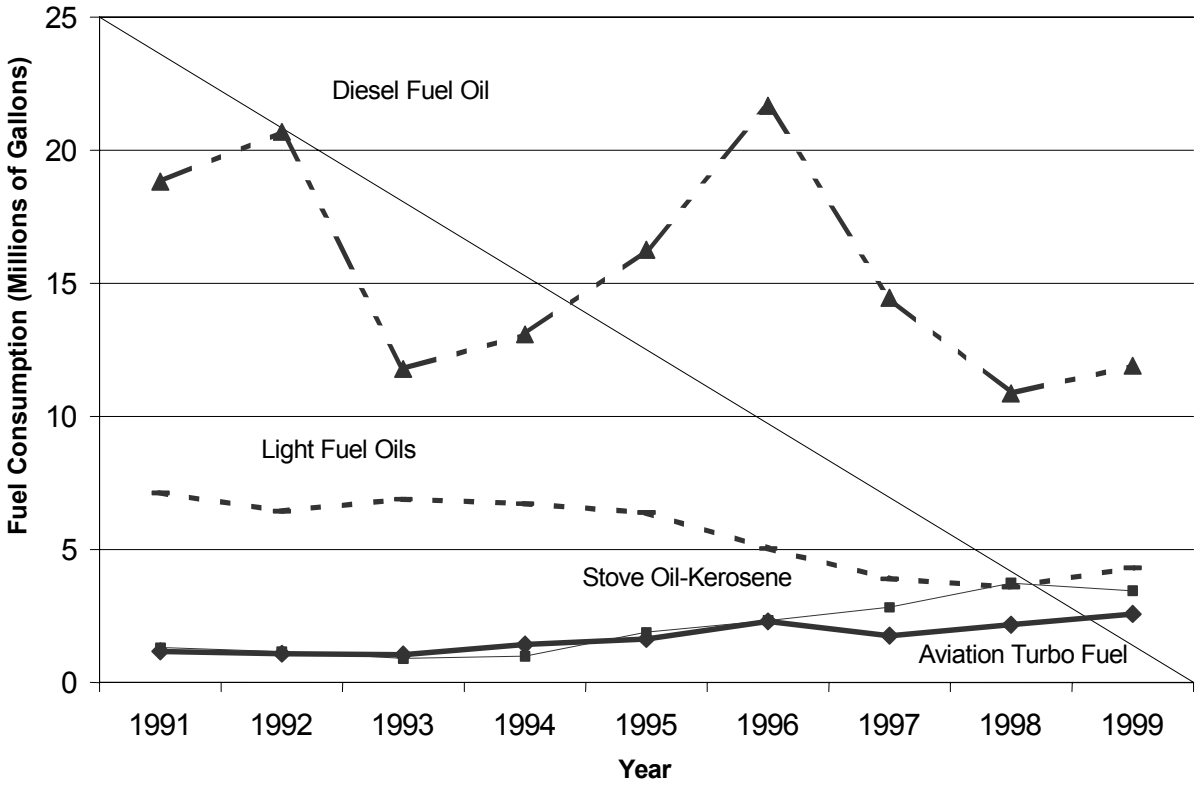
Annual consumption of certain refined products in the Yukon Territory is shown in Figure 4-5 and Table 4-2. Light fuel oil, stove oil and kerosene, and aviation fuel consumption all have remained steady in recent years. Diesel fuel consumption, however, has fluctuated greatly. Consumption declined from 1996 to 1998 by approximately 50 percent, then rose by approximately 10 percent in 1999. These data do not distinguish low-sulfur products from high-sulfur products.

Figure 4-4. Annual Population of Yukon Territory, 1991-1999



Source: Yukon Statistical Review, 2000.

Figure 4-5. Yukon Territory Fuel Consumption, 1991-1999



Source: Yukon Statistical Review, 2000.

Table 4-2. Yukon Territory Fuel Consumption, 1991-1999

Year	Fuel Consumption (Millions of Gallons)				
	Aviation Turbo Fuel	Stove Oil Kerosene	Diesel Fuel Oil	Light Fuel Oil	Total
1991	1.176	1.312	18.823	7.124	28.434
1992	1.087	1.157	20.686	6.441	29.371
1993	1.047	0.909	11.787	6.892	20.634
1994	1.421	0.991	13.073	6.717	22.202
1995	1.635	1.891	16.258	6.387	26.170
1996	2.301	2.327	21.662	5.044	31.333
1997	1.762	2.827	14.460	3.902	22.952
1998	2.177	3.742	10.862	3.590	20.372
1999	2.572	3.447	11.897	4.313	22.229

Source: Yukon Statistical Review, 1999.

Fuel consumption in the Yukon Territory in 1999 totaled 22.229 million gallons. According to Statistics Canada, Canada imported approximately 7.15 million gallons of low-sulfur, on-road diesel fuel from Alaska in 1999. If the low-sulfur fuel imported is subtracted from the total fuel volume in that year, the approximate amount of high-sulfur fuel consumed was about 15 million gallons. This amount is approximately 500 gallons per capita and represents the potential market in the Yukon Territory for products of the proposed topping plant.

One Canadian distributor reported that it imports only low-sulfur fuel from Alaska, no matter what its end use might be. The manager explained that the criminal and civil liabilities associated with erroneously putting high-sulfur fuel in a motor vehicle would cost more than the amount saved when purchasing high-sulfur fuel. According to one distributor, some low-sulfur fuel from Alaska is shipped to Haines and then transported into Whitehorse. Given that information, it is likely that a portion of the low-sulfur diesel being imported is destined for use as home heating fuel.

4.1.3.4 U.S. Military Target Market

A larger consumer of refined petroleum products in the target market area is the U.S. Army. At Fort Greely, approximately five miles south of Delta Junction, the Army uses approximately 1.25 million gallons of heating fuel and approximately 265,000 gallons of jet fuel each year (Banez, 2000). Although Fort Greely is undergoing realignment, Army personnel believe that the heating fuel demand for the base will not decline significantly in the future. If the base is converted to a more active use in the future, these sources believe that consumption of refined products may increase (Anderson, 2000).

Military entities in Alaska purchase both jet fuel and heating oil by soliciting prices and awarding requirements contracts for its various facilities.[5] Heating fuel contracts typically have a 2-year term. Jet fuel is typically purchased with one-year contracts. Contracts are awarded on a base price that is subject to weekly reviews and adjustments throughout the term to accommodate changes in the market price of fuel products.

[5] In a requirements contract, the supplier agrees to fulfill the buyer's requirements for a commodity and the buyer agrees to purchase the agreed-upon volume of the commodity.

4.1.3.5 Alyeska Pipeline Service Company

Alyeska Pipeline Service Company operates and maintains the Trans-Alaska Pipeline. As of January 1, 1997, the company had nine operating pump stations. These stations consume fuel in their operation. Pump Station 9, which is in the Delta Junction area, uses 18 million gallons per year (Alyeska, 2000). Currently the North Pole Petro Star refinery provides fuel to Alyeska.

Large-volume buyers such as Alyeska and the U.S. military can command below-market prices. Large-volume buyers also make volatility in market sales more extreme. For example, if the proposed refinery obtains a contract to supply Pump Station 9 for 1 year, and then loses that contract the next year, revenue would be affected severely.

4.1.3.6 Influence of Environmental Regulation on Target Markets

Refineries and their outputs are highly regulated because of environmental concerns. Regulations in the 1990 Clean Air Act and Canadian Environmental Protect Act (CEPA) distinguish high-sulfur and low-sulfur refined products. The 1990 Clean Air Act and the CEPA mandate a minimum of 500 ppm of sulfur in diesel fuel for on-road use. Alaska is currently exempted from the low-sulfur provisions of the Clean Air Act until 2004. The CEPA sets similar requirements that apply to all of Canada. The Environmental Protection Agency (EPA) is reviewing the sulfur provisions of the Clean Air Act. There is belief among regulatory authorities in Alaska that the EPA and Environment Canada will be lowering the sulfur content requirements for on-road diesel fuel, possibly to as low as 15 ppm, before the end of this year. The current targeted date for these rules to come into effect is June 2006. In May, the Prime Minister of Canada agreed to meet the EPA 15-ppm, on-road limit by the same date (Stephanson, 2000). There is also speculation that non-road fuels may be subject to similar regulatory limits within the next year or two. Whether or not either or both of these changes would be applicable in Alaska is uncertain. The American Petroleum Institute is advocating a limit no lower than 50-ppm of sulfur for all fuels (King, 2000). Until these regulations take effect in Alaska, trucks in Alaska will continue to use high-sulfur diesel.

If environmental regulations in Alaska and Canada change, products sold in the market areas will change. Only the Tesoro refinery is able to produce diesel below 500 ppm, by using Cook Inlet crude oil. Alaska refineries would have to incur capital expenditures to meet low-sulfur standards; the Williams refinery estimated it would cost $100 million to meet the 500-ppm standard. Industry representatives believe that currently no economically viable technology exists that would permit small refineries to produce low-sulfur fuels. The EPA questioned whether the small Alaska market would support the expense of converting to low-sulfur production (*Alaska Journal of Commerce*, 2000). If existing refineries are not willing to convert to low-sulfur diesel, the supply of high-sulfur heating fuel produced in Alaska will increase. Accordingly, competition among the existing refineries for the high-sulfur will increase, and prices in that market are likely to be lower. The alternative is to install expensive technology to meet low sulfur requirements and attempt to compete in that market.

4.1.4 Competitive Analysis

4.1.4.1 Location

Because refinery feedstock and products are expensive to transport, refineries must be close to their feedstock sources and their markets. It is advantageous to locate a refinery next to a pipeline. Feedstock is transported and residual is disposed of in an efficient manner. The Delta Junction location next to the Trans-Alaska Pipeline, and specifically next to a pump station, represents a cost advantage. Locating next to a pump station could significantly reduce the cost of connecting to the pipeline. Three of the four existing refineries are similarly adjacent to the Trans-Alaska Pipeline.

The Delta Junction site would be closer than any of the four existing refineries to the Canadian market. Delta Junction is approximately 90 miles from North Pole. The estimated cost per mile to transport fuel by truck is between $1.22 and $1.35 (Bolinger, 2000; C.E.M., 2000). Fuel trucks typically haul between 9,100 and 14,000 gallons per load. This volume represents a cost between $0.008 and $0.0267 per gallon (180 miles x price per gallon divided by the number of gallons hauled). If a buyer hires an independent hauling firm to transport fuel, the hauling company will charge its cost plus a profit. In September 2000, the rate that haulers charged buyers to transport fuel between Fairbanks and Delta Junction is $0.0486 per gallon (C.E.M., 2000). When comparing prices for a North Pole refinery and the Delta Junction refinery, a fuel buyer from the Canadian market will see a difference of between $0.008 and $0.0486 per gallon, depending on the costs of transportation.

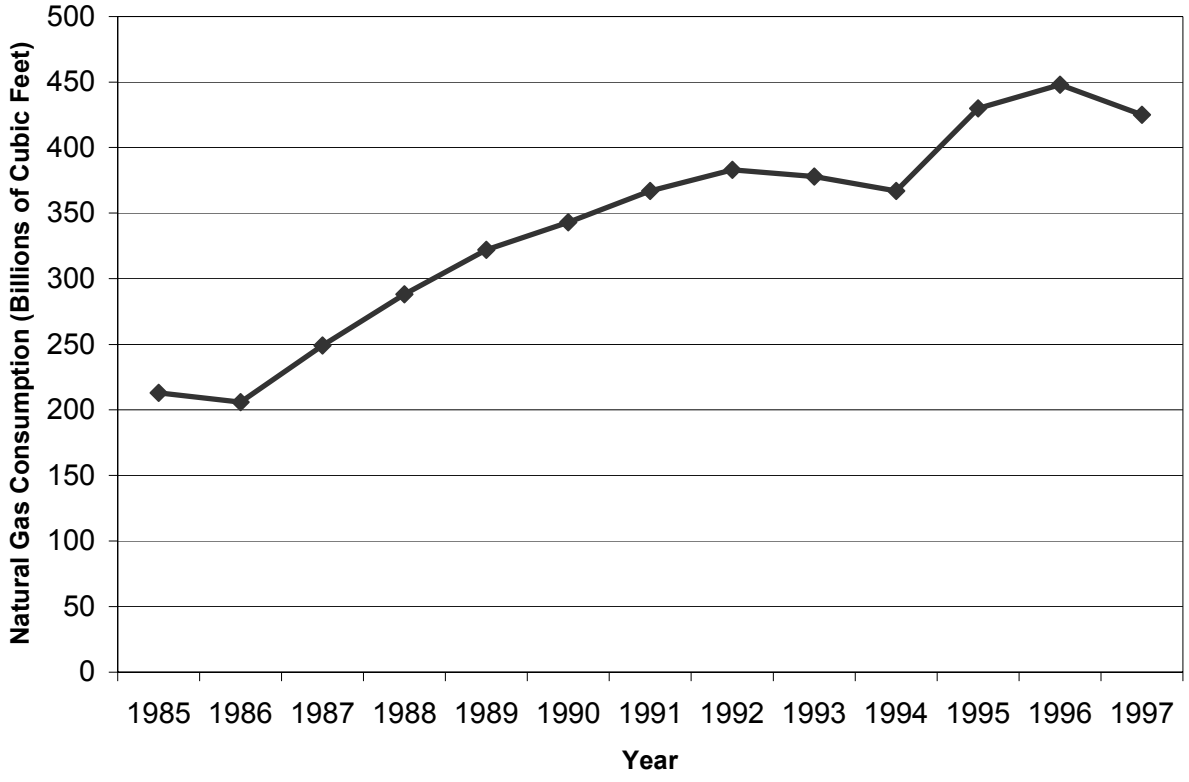
Delta Junction would pay more for feedstock than North Pole refineries pay, because it is further from the oilfield. North Pole refineries would pay approximately $0.228 per barrel less for crude oil ($0.005 per gallon). This increased cost would offset Delta Junction's proximity to the market.

Location becomes less important when transportation costs are lowered. According to industry specialists, when U.S. pipeline networks lowered transportation costs of fuel, smaller refineries closed down in the face of competition from larger refineries, and now fewer refineries are in hub areas. Small refineries still operate only in Alaska and the remote areas of the western U.S. (Stanley, 2000).

4.1.4.2 Natural Gas Pipeline

Recent news articles have reported that a pipeline may be developed to deliver natural gas from the North Slope to the Lower 48 states. One possible route would extend from Fairbanks along the Richardson Highway to Delta Junction, then either along the Alaska Highway into Canada or along the Richardson Highway to Valdez (*Alaska Journal of Commerce*, 2000). The piping of natural gas through the area to be served by the proposed refinery may have a significant impact on demand for home heating fuel oil in that market. Figure 4-6 shows steadily increasing natural gas consumption in Alaska from 1985 to 1997. Introduction of natural gas to Southcentral Alaska in 1986 explains the marked increase since that time. Pipeline development will take several years, and conversion of diesel home heating units will happen gradually. The availability of natural gas supplies to the market, however, will likely result in some decline in home heating fuel consumption in the long term.

Figure 4-6. Natural Gas Consumption in Alaska, 1985-1997



Source: Energy Information Administration, 2000.

4.1.4.3 Existing Refineries and Products

To succeed, the topping plant must capture a portion of the petroleum products market from existing refineries. Therefore, a brief discussion of those refineries and their markets and products is used to examine the potential of the proposed topping plant to successfully enter the market.

In Alaska, four existing refineries are owned by three firms.[6] Two of these refineries are at North Pole, one in Valdez, and one in Nikiski. The refineries differ by the types and quantities of products they produce. Topping plants are capable of producing only distillates, which include jet fuels, diesel fuels, kerosene, and naphtha. Production of gasoline requires a catalytic converter, which is not part of a topping plant. One North Pole refinery and the Nikiski refinery are capable of producing gasoline.

Total fuel produced by Alaska refineries and total sales of fuel products in Alaska are shown in Table 4-3.

Table 4-3. Fuel Production and Sales in Alaska, 1999

Refinery	Volume Produced or Sold (Millions of Gallons)		
	Total Refined Product	Gasoline	Total Other Fuels
Williams	932.06	177.09	754.97
Petro Star (North Pole)	50.97	-	50.97
Petro Star (Valdez)	145.64	-	145.64
Tesoro	734.00	183.50	550.50
Subtotal	1,862.67	360.59	1,502.08
Alaska Fuel Sales	1,788.80	297.00	1,491.80
Excess Supply	**73.87**	**63.59**	**10.28**

Source: Alaska Department of Natural Resources, 2000.

Williams Refinery at North Pole

Williams is a petroleum company operating nationwide. It owns the largest refinery in Alaska, at North Pole. The refinery was opened in 1977 and was formerly owned by Mapco. It processes 215,000 barrels per day (bpd) that results in the production of 64,000 bpd of refined products. This refinery is able to retain 30 percent of the crude feedstock as final product, a higher than average margin, and higher than the 20 to 25 percent conversion rate projected for the Delta Junction plant. The facility receives its crude oil from the Trans-Alaska Pipeline, and deposits its residuals back into the pipeline. The Williams refinery produces gasoline (19 percent), jet fuel (57 percent), diesel fuel (19 percent), gas oil (4 percent), and asphalt (1 percent). The products are sold and transported into the Southcentral Alaska market (DNR, 2000).

Currently, the Williams refinery is the state's largest producer of jet fuel and serves approximately 50 percent of the Alaska jet fuel market. Because demand for jet fuel in Alaska exceeds in-state

[6] In addition, two refineries on the North Slope process fuel that is consumed onsite exclusively.

supply, jet fuel is imported. Williams and a partner completed a CargoPort facility at Anchorage International Airport this year. Completion of this facility should facilitate increased jet fuel sales, as Williams strives to capture a larger share of the market (*Energy Services Quarterly Review*, 2000).

Alaskan and Canadian distributors within the Delta Junction target market report that they purchase diesel fuel from the Williams plant. Williams has retail fuel stations throughout Southcentral, Interior, and Southeast Alaska as markets for their fuel. Williams is also able to transport fuel by road and rail.

Tesoro Refinery at Nikiski

Tesoro is the second-largest independent refining company in the western United States. Built in 1969, its Nikiski refinery is the oldest and most complex refinery in Alaska. It processes approximately 72,000 bpd of throughput from which it produces gasoline (25 percent), jet, diesel and fuel oil (40 to 45 percent), and residuals (30 percent). Tesoro exports residuals to refineries outside Alaska that process them into petrochemicals (CEM, 2000). The Tesoro refinery uses crude oil inputs from the Cook Inlet oil fields and from imported sources. The refinery differs from other Alaska refineries because it supports both distillate and conversion processes (DNR, 2000). The Cook Inlet crude feedstock is lower in sulfur than the North Slope crude used by other refineries in the state. As a result, the Nikiski refinery is currently the only refinery in Alaska that can produce diesel fuel containing less than 500 ppm of sulfur. (King, 2000.) Since Canadian regulations require road fuels to have less than 500-ppm sulfur, the Tesoro refinery is the only apparent Alaska supplier of on-road diesel to the Yukon Territory. Products from the refinery are also transported by road, water, and pipeline throughout Alaska. The Tesoro refinery also supports the growing jet fuel market in Anchorage. The refinery provides marine fuels, home heating fuels; and feeds a network of more than 150 retail fuel outlets in Alaska and Canada.

Petro Star Refinery at North Pole

The Petro Star refinery at North Pole has been in operation since 1985. It processes approximately 14,000 bpd of crude oil throughput, from which it produces jet fuel (50 percent), diesel, and kerosene. The refinery retains approximately 25 percent of the crude inputs as final product. Petro Star's North Pole facility takes its crude oil inputs from the Trans-Alaska Pipeline, and deposits its residuals back into the pipeline. The refinery serves Interior Alaska, providing fuel to some communities; to the military at Fort Wainwright, Fort Greely, and Eielson Air Force Base; to commercial customers such as Usibelli Coal Mine and Alyeska Pipeline; and to the North Slope industrial market. Petro Star is able to transport its fuel by road and rail.

Petro Star, Inc. is a subsidiary of the Arctic Slope Regional Corporation (ASRC). Sourdough Fuel, also a subsidiary of ASRC, provides interior Alaska with heating and diesel fuel directly from the Petro Star refineries. Sourdough Fuel distributes throughout the Fairbanks area, Valdez, Canadian Border, Tok, Prudhoe Bay, Anchorage, and Kenai areas. Sourdough serves more than 11,000 customers with heating fuel, and operates at least eight retail gas stations.

Petro Star Refinery at Valdez

The Petro Star facility in Valdez began operations in 1992. It processes approximately 40,000 bpd of crude oil throughput. This refinery produces jet fuel, marine diesel, and heating fuel. (DNR, 2000) The Valdez facility takes crude inputs from the Trans-Alaska Pipeline and returns residual crude to the pipeline. The majority of the refinery's products are shipped from the Valdez Petroleum Terminal to Anchorage, Kodiak, Dutch Harbor, and coastal Alaska. The refinery produces marine diesel, jet fuel, and heating fuel to private, military, and commercial markets from Valdez to Anchorage, Dutch

Harbor, and Alaska's North Slope (Petro Star, 2000). They provide jet fuel to the military and marine diesel to coastal areas of Alaska.

Proposed Arctic Energy Refinery at North Pole

A recent article in the *Alaska Journal of Commerce* described an interview with James Dieringer, owner of Arctic Energy of Fairbanks. Arctic Energy intends to open an additional refinery at North Pole. This proposed refinery would take 30,000 bpd throughput and produce 6,000 bpd of distillate, adding approximately 87.38 million gallons of fuel annually to the Alaska market. Mr. Dieringer told Northern Economics that he intends to begin construction in the spring of 2001 (Dieringer, 2000). The Arctic Energy refinery would be able to transport its products by road and rail.

Competing Suppliers and Competing Products

According to industry specialists, refineries need a marketing advantage to compete. All the existing Alaska refineries have direct links to retail markets, for example, the home heating fuel market served by Petro Star through its sister subsidiary, Sourdough Fuel. The proposed refinery at Delta Junction would attempt to take a share of this market. Local distributors estimate that Sourdough Fuel has 35 percent of the home heating fuel target market. That market would be difficult to capture from the wholesale position. If prices drop at the refinery because of a supply glut, those refineries with ties to the retail sector will have an advantage. Profit losses at the refinery may be offset by gains in the retail market.

Some of the competing refineries enjoy economies of scale. Historically in the U.S., larger refineries have squeezed out small refineries because they are able to operate at lower costs per volume of product produced.

Competing refineries in Alaska enjoy the advantage of multi-modal means of transporting their refined products. For a topping plant in Delta Junction, transportation would be limited primarily to highway, which is typically more expensive than other modes (Bollinger, 2000).

Certain government contracts grant a bidder's preference to minority bidders. In a competitive bid where a contract is awarded based on the lowest price, a bidder's preference allows a certain percentage to be reduced from the per-unit bid amount. The Arctic Slope Regional Corporation has an ownership interest in the Petro Star refineries, and likely enjoys an Alaska Native preference when competitively bidding.

A part of the federal grant of right-of-way for the Trans-Alaska Pipeline construction contained a provision (Section 29) for recruitment, testing, training, placement, employment, and job counseling of Alaska Natives. In 1995 Alyeska Pipeline Service Company entered into a Native Utilization Agreement with the Department of Interior to further the company's compliance with that provision. Alyeska uses subcontractors who give Native hire preference to meet its commitment under the agreement. As a Native-owned organization, Petro Star will likely be given subcontract preference by Alyeska.

If a natural gas pipeline is routed through the Delta Junction area, the offroad diesel and heating fuel markets will be affected. Natural gas burns more cleanly and more efficiently than heating oil, and most new development in the area will be designed to use natural gas. Conversion of existing fuel heating units to natural gas heating units is also anticipated. It would be more cost-effective for large-scale users of fuel, such as Alyeska and the military, to convert to natural gas. Such conversion would reduce the target market significantly.

4.1.5 Financial Analysis

Proponents of the topping plant have discussed with Ventech Engineering the possible purchase of a 20,000-barrel per day throughput topping plant. The plant would be capable of refining these 20,000 barrels per day of crude petroleum into 4,000 to 5,000 barrels of refined products. The retention rate is dependent on the choice of outputs. Possible outputs include aviation gasoline, jet fuel (JP4 and JP8), diesel No. 1, diesel No. 2, kerosene, and propane. Crude oil inputs would be taken from the Trans-Alaska pipeline and residual products would be returned to the pipeline.

The revenues and costs shown in this financial analysis are estimates based on available data. Costs per barrel were provided by Ventech Engineering, and were developed through interpretation of Trans Alaska Pipeline tariffs. Revenues were estimated using prices posted by the Oil Price Information Service (OPIS). The actual costs and revenues could be higher or lower, depending on actual production costs and market prices. A more in-depth study will be required to obtain estimates that are more precise.

4.1.5.1 Operating Cost Margins

This section discusses estimated costs and potential revenue from operation of the proposed topping plant. Cost estimates of annual production of 4,000 barrels per day (bpd) are based on information from Ventech Engineering. Production costs include costs for operation, maintenance, feedstock, residual disposal, connection to the pipeline, and capital amortization.

The estimated capital cost of a high sulfur producing plant is approximately $18 million, including storage tanks, design, and permitting. The plant would need to obtain a permit from the Alaska Department of Environmental Conservation (ADEC). The permitting process will take 3 months or more (Moore, 2000).

Annual capital costs were calculated under the assumption that two loans were obtained for the purchase of the plant. The first loan would be secured from the Alaska Industrial Development and Export Authority (AIDEA) for $10 million for 25 years at an interest rate of 9.13 percent. The remaining amount is assumed to be financed in the private market at an estimated interest rate of 10 percent over a 10-year period.

Maintenance costs are estimated at 4 percent per year of the initial capital costs.

Crude feedstock for production would be obtained from the Trans-Alaska Pipeline. The pipeline is managed by Alyeska Pipeline Service Company and owned by a consortium of North Slope oil producers. Crude could be purchased from one of the owners of the oil, or from the state of Alaska. The state takes some of its royalties in the form of crude oil, which it then sells. Feedstock is assumed to be purchased from the state. Based on the ADOR wellhead price for fiscal year 2000, and estimating the tariff rate to Delta Junction based on existing published tariffs, crude could be purchased for approximately $0.50 per gallon (or $21 per barrel) (Scott, 2000).

The cost to redeposit residuals into the pipeline is based on the quality bank methodology. By estimating output, the amount and composition of residuals, and a reference value for these residuals, the redeposit cost was estimated at $0.18 per gallon.

Combining the amortized capital costs, operation and maintenance costs, feedstock costs, and residual disposal costs, the cost of production is approximately $0.85 per gallon of product.[7]

[7] Production prices are expected to vary for the different products. More precise estimates should be obtained for future analyses.

For purposes of this analysis, it is assumed that the market demand will dictate that diesel No. 1 is three-fourths of total output and diesel No. 2 is one-fourth of total output. Diesel No. 2 sells for less in the market and is the heating fuel of choice. At colder temperatures, however, diesel No. 2 cannot be used because it thickens. Diesel No. 1 must be substituted when temperatures are expected to drop below –15°F.

Estimated returns are calculated by subtracting the total costs from the market price. The market price is based on Oil Price Information Service (OPIS) prices for the week of August 21, 2000. OPIS posts weekly prices in Seattle and Anchorage. Local distributors in the Alaska target market indicated that they would purchase the high-sulfur fuel for Anchorage OPIS price, minus $0.10 per gallon ($0.9638 for Diesel No. 1, and $0.9344 for Diesel No. 2). These market prices and production costs are used in the sensitivity analysis to determine the profitability of the proposed refineries under different market assumptions.

Prices of feedstock and prices for final refined products vary daily, so margins are constantly changing. For comparison purposes and to simplify the analysis, prices were held constant.

4.1.6 Sensitivity Analysis

This section analyzes the effects of market changes on the proposed refinery's profits. Estimates are calculated for two refineries (one with 10,000 bpd throughput and one with 20,000 bpd throughput). A 20-000-bpd refinery producing a low-sulfur product was also analyzed. A low-sulfur-producing, 10,000-bpd throughput refinery was not analyzed because of large capital costs associated with desulfurization equipment.

Table 4-4 summarizes financial outcomes for the various refineries for the three scenarios. In the base case, the plant sells its entire production at the market price. Three scenarios were constructed to model problems with market size and competitor responses likely to be confronted by the Delta Junction refinery. The target market for the Delta Junction refinery is not large enough to accommodate the entire proposed volume of refined product. The Delta Junction refinery may need to enter markets outside the target market area. In the first alternative scenario, the refinery is assumed to be unable to sell all of the fuel it produces. The plant is only able to sell 85 percent of its production.

If supply exceeds demand for distilled products, prices will fall. In the competitive Alaska refinery market, it is possible, and even likely, that the sales price for fuel will fall below market prices. It is also likely that any large-volume competitive bid will be for a below-market price. In the second scenario, the refinery sells all of its fuel at a price 12 percent below the market price. Either of the scenarios may occur in a competitive market.

In the first two scenarios, it was assumed that 4,000 bpd (58,254,000 gallons) is produced. Although the plant may scale back production in some competitive situations, many of the production costs cannot be reduced. Fixed costs associated with debt repayment would be the same. The operating costs associated with personnel and maintenance may be lowered slightly. Most professional staff, however, will not work on an on call basis. The costs associated with crude input and residual returns to the pipeline would be lowered. Sufficient information, however, is not available to precisely analyze outcomes associated with reduced production.

A third alternative, however, has been presented to examine the case of the plant reducing its production to 85 percent of the base case level. In the scenario, only the costs of crude feedstock and returning residuals to the pipeline are reduced from the base case.

Each alternative is a crude estimate of a scenario that may arise at the plant. Output choices may differ from those projected here. In actuality, adjustments to the quantities of the different outputs will affect costs through many factors. Starting and stopping operations will have costs, and changing of outputs will have costs. The plant may also be able to save on operating costs while the plant is not operating. Effects such as these cannot be predicted in this study. Therefore, each of the scenarios should be considered a rough estimate of the plant's operations.

In the base case, the large refinery is estimated to have profits. In the first scenario, where the volume of fuel sold is reduced by 15 percent (selling 85 percent of its product), costs would exceed revenues. Similarly, in the second scenario, where the sale price of fuel is reduced by 12 percent below the estimated market price, costs would exceed revenues. The small refinery proved more sensitive to market changes, showing a loss with a 10 percent change in volume or price. The scenarios, however, used the same percentage decreases in sales and in price to allow comparison of the results for the different size plants.

Table 4-4. Profit (Loss) from Refinery by Size, Product, Volume Sold, and Price

Refinery Unit	Scenario	Profit (Loss) ($)
Large Refinery (20,000-bpd unit)		
High-Sulfur	Base Case	6,186,834
Sensitivity Analysis	Reduced Sales Price (12 percent below market)	(454,211)
	Reduced Sales Volume (85 percent of production)	(2,125,722)
	Reduced Production (85 percent of base)	3,752,621
Low-Sulfur	Base Case	7,365,217
Sensitivity Analysis	Sales Price (12 percent below market)	(249,688)
	Sales Volume (85 percent of production)	(2,153,414)
Small Refinery (10,000-bpd unit)		
High-Sulfur	Base Case	2,614,260
Sensitivity Analysis	Reduced Sales Price (12 percent below market)	(761,263)
	Reduced Sales Volume (85 percent of production)	(1,597,018)
	Reduced Production (85 percent of base)	1,364,653

4.1.6.1 Large Refinery, High-Sulfur Product

If all fuel produced is sold at market price, a profit is possible. Table 4-5 shows the amount of annual revenue possible from operation of the proposed large refinery with sales of all production at the market price.

If the Delta Junction refinery were able to sell only 85 percent of its output (49.5 million gallons per year) its costs would exceed revenues. The cost to amortize capital would drive the total cost per gallon up significantly. Table 4-6 subtracts the costs to produce 58 million gallons from the revenues received from the sale of 49.5 million gallons of product sold at market price.

The estimates in Table 4-7 assume that prices fall 12 percent below the market price. It assumes that all of the fuel produced sells. As the estimate indicates, it is not feasible for the proposed refinery to lower its prices below 12 percent of market price. The estimates in Table 4-8 suggest that if the refinery is able to reduce production to 85 percent of capacity, sell its entire production at market price, and avoid paying for feedstock and for the return of residuals to the pipeline, the refinery may still earn a profit.

Table 4-5. Sale of High-Sulfur Product at Market Price, Large Refinery (Base Case)

Product	Production (No. of Gallons)	Amount per Gallon ($)			Total Amount ($)		
		Production Cost	Market Price	Margin	Total Cost	Total Revenue	Profit
Diesel No.1	43,690,500	0.8502	0.9638	0.1136	37,147,653	42,108,904	4,961,251
Diesel No.2	14,563,500	0.8502	0.9344	0.0872	12,382,551	13,608,134	1,225,583
Total	**58,254,000**				**49,530,204**	**55,717,038**	**6,186,834**

Table 4-6. Sale of High-Sulfur Product, Less than Maximum Quantity, Large Refinery

Product	Production (No. of Gallons)	Amount per Gallon ($)			Total Amount ($)		
		Production Cost	Market Price	Margin	Total Cost	Total Revenue	Profit
Diesel No.1	43,690,500	0.8502	0.9638	0.1136	37,147,653	35,792,568	(1,355,085)
Diesel No.2	14,563,500	0.8502	0.9344	0.0872	12,337,551	11,566,914	(770,637)
Total	**58,254,000**				**49,485,204**	**47,359,483**	**(2,125,722)**

Note: This model assumes that the plant is capable of selling only 85 percent of its production.

Table 4-7. Sale of High-Sulfur Product at Less than Production Output, Large Refinery

Product	Production (No. of Gallons)	Amount per Gallon ($)			Total Amount ($)		
		Production Cost	Market Price	Margin	Total Cost	Total Revenue	Profit
Diesel No.1	43,690,500	0.8502	0.8481	(0.0021)	37,147,653	37,055,835	(91,818)
Diesel No.2	14,563,500	0.8502	0.8223	(0.0249)	12,337,551	11,975,158	(362,393)
Total	**58,254,000**				**49,485,204**	**49,030,994**	**(454,211)**

Note: This model assumes that sales of product by the plant are 12 percent below the market price.

Table 4-8. Sale of High-Sulfur Product at Lower Production Output, Large Refinery

Product	Production (No. of Gallons)	Amount per Gallon ($)			Total Amount ($)		
		Production Cost	Market Price	Margin	Total Cost	Total Revenue	Profit
Diesel No.1	37,136,925	0.880664	0.9638	0.083136	32,705,146	35,792,568	3,087,423
Diesel No.2	12,378,975	0.880664	0.9344	0.053736	10,901,715	11,566,914	665,199
Total	**49,515,900**				**43,606,861**	**47,359,483**	**3,752,621**

Note: This model assumes that production by the plant is at 85 percent below the base case. The only reduction in production cost is in the cost of feedstock and returning residuals to the pipeline.

4.1.6.2 Smaller Refinery

To accommodate the relatively small demand in the target market, the refinery could be of a type that processes less throughput. The estimated cost for a refinery that uses 10,000 bpd throughput and produces 2,000 bpd, according to Ventech Engineering, is approximately $13 million, assuming that all other costs stay the same. At optimal operation, profit is possible. Table 4-9 illustrates this potential profit, assuming that capital and operating costs are accurate. If a small refinery has a 12 percent price drop, and if it sells its entire production, costs will exceed revenues, as illustrated in

Table 4-10. A small refinery also would lose money if sales decline to lower than 85 percent of production, as shown in Table 4-11. The estimate in Table 4-12 suggest that the small refinery may show a profit with production at 85 percent of capacity, if it sells its entire production at market price and avoids paying for feedstock and for the return of residuals to the pipeline.

Table 4-9. Sale of High-Sulfur Product at Market Price, Small Refinery (Base Case)

Product	Production (No. of Gallons)	Amount per Gallon ($)			Total Amount ($)		
		Production Cost	Market Price	Margin	Total Cost	Total Revenue	Profit
Diesel No.1	21,845,250	0.8678	0.9638	0.0960	18,957,570	21,054,452	2,096,882
Diesel No.2	7,281,750	0.8678	0.9344	0.0711	6,286,690	6,804,067	517,377
Total	**29,127,000**				**25,244,260**	**27,858,519**	**2,614,260**

Table 4-10. Sale of High-Sulfur Product at Less than Market Price, Small Refinery

Product	Production (No. of Gallons)	Amount per Gallon ($)			Total Amount ($)		
		Production Cost	Market Price	Margin	Total Cost	Total Revenue	Profit
Diesel No.1	21,845,250	0.8678	0.8481	-0.0004	18,957,570	18,527,918	(429,652)
Diesel No.2	7,281,750	0.8678	0.8223	-0.0224	6,319,190	5,987,579	(331,611)
Total	**29,127,000**				**25,276,760**	**24,515,497**	**(761,263)**

Note: This model assumes that sales of product by the plant are at 12 percent below the market price.

Table 4-11. Sale of High-Sulfur Product, Less than Production Output, Small Refinery

Product	Production (No. of Gallons)	Amount per Gallon ($)			Total Amount ($)		
		Production Cost	Market Price	Margin	Total Cost	Total Revenue	Profit
Diesel No.1	21,845,250	0.8678	0.9638	0.0960	18,957,570	17,896,284	(1,061,286)
Diesel No.2	7,281,750	0.8678	0.9344	0.0711	6,319,190	5,783,457	(535,733)
Total	**29,127,000**				**25,276,760**	**23,679,741**	**(1,597,018)**

Note: This model assumes that the plant is capable of selling only 85 percent of its production.

Table 4-12. Sale of High-Sulfur Product at Lower Production Output, Small Refinery

Product	Production (No. of Gallons)	Amount per Gallon ($)			Total Amount ($)		
		Production Cost	Market Price	Margin	Total Cost	Total Revenue	Profit
Diesel No.1	18,568,463	0.90133	0.9638	0.06247	16,736,316	17,896,284	1,159,968
Diesel No.2	6,189,488	0.90133	0.9344	0.03307	5,578,772	5,783,457	204,685
Total	**24,757,950**				**22,315,088**	**23,679,741**	**1,364,653**

Note: This model assumes that production by the plant is at 85 percent below the base case. The only reduction in production cost is in the cost of feedstock and returning residuals to the pipeline.

4.1.6.3 Low-Sulfur Production

Because North Slope crude is high in sulfur, the output of this plant would contain sulfur in the range of 50,000 to 170,000 ppm, unless further treatment was made to reduce the sulfur content. If environmental regulations require Alaska refineries to lower sulfur content in distillates, the topping plant would need to be modified. To lower sulfur content of the refined products to 50 ppm, according to Ventech, it would be necessary to install the following additional processing units:

- Hydro-treater
- Amine scrubber
- Sulfur recovery unit
- Hydrogen production unit

The additional capital costs for these units would be $18 million. Operating costs would increase to $7 per barrel of output. The remaining costs were calculated using the same methods used for the low-sulfur plant. The market price is based on Oil Price Information Service (OPIS) prices for the week of August 21, 2000. Local distributors in the Yukon Territory target market indicated that they would purchase low-sulfur fuel for Seattle OPIS price, plus $.08 per gallon ($1.1126 for No. 1 and $1.0195 for No. 2). Table 4-13 illustrates that it is feasible to operate a refinery that produces low-sulfur diesel, assuming capital estimates are accurate, and all production is sold at market price. Table 4-15 illustrates that if only 85 percent of production sells at market price, the plant will experience losses. Similarly, Table 4-15 illustrates losses when the production sells at 12 percent below market price.

Table 4-13. Sale of Low-Sulfur Product at Market Price, Large Refinery (Base Case)

Product	Production (No. of Gallons)	Amount per Gallon ($)			Total Amount ($)		
		Production Cost	Market Price	Margin	Total Cost	Total Revenue	Profit
Diesel No.1	43,690,500	0.9629	1.1126	0.1497	42,069,241	48,610,050	6,540,809
Diesel No.2	14,563,500	0.9629	1.0195	0.0566	14,023,080	14,847,488	824,408
Total	**58,254,000**				**56,092,322**	**63,457,539**	**7,365,217**

Note: This model assumes that sales of product by the plant are 12 percent below the market price.

Table 4-14. Sale of Low-Sulfur Product at Less than Market Price, Large Refinery

Product	Production (No. of Gallons)	Amount per Gallon ($)			Total Amount ($)		
		Production Cost	Market Price	Margin	Total Cost	Total Revenue	Profit
Diesel No.1	43,690,500	0.9629	0.9791	0.0566	42,069,241	42,776,844	707,603
Diesel No.2	14,563,500	0.9629	0.8972	0.0566	14,023,080	13,065,790	(957,291)
Total	**58,254,000**				**56,092,322**	**55,842,634**	**(249,688)**

Note: This model assumes that sales of product by the plant are 12 percent below the market price.

Table 4-15. Sale of Low-Sulfur Product, Less than Production Output, Large Refinery

Product	Production (No. of Gallons)	Amount per Gallon ($)			Total Amount ($)		
		Production Cost	Market Price	Margin	Total Cost	Total Revenue	Profit
Diesel No.1	43,690,500	0.9629	1.1126	0.0566	42,069,241	41,318,543	(750,698)
Diesel No.2	14,563,500	0.9629	1.0195	0.0566	14,023,080	12,620,365	(1,402,715)
Total	**58,254,000**				**56,092,322**	**53,938,908**	**(2,153,414)**

Note: This model assumes that the plant is capable of selling only 85 percent of its production.

4.1.6.4 Production at Increased Costs

An additional $5 million has been added to the $18 million estimated cost to include connection to the pipeline, and to accommodate increased costs unique to Alaska construction. Construction of the plant at any significant distance from the pipeline will increase capital costs. The estimate in Table 4-16 assumes amortization of the additional $5 million for 10 years at 10 percent interest and the sale of all production at market price.

Table 4-16. Costs and Revenues for $23 Million Refinery at Maximum Capacity

Product	Production (No. of Gallons)	Amount per Gallon ($)			Net Revenue ($)
		Production Cost	Market Price	Margin	
Diesel No.1	43,690,500	0.8642	0.9638	0.0996	4,350,955
Diesel No.2	14,563,500	0.8642	0.9344	0.0733	1,067,152
Total	**58,254,000**				**5,418,107**

4.1.6.5 Use of Waste Heat at the Refinery

Several uses for waste heat from the topping plant have been suggested. The use of the heat for vegetable processing and forest products processing uses are discussed in sections 4.5 and 4.6. An additional proposed use is power generation. The proposal is for the power produced by the waste heat to be used to extend an intertie to Tok to assist with undersized power generation facilities. A distribution line extends south of Delta Junction in the direction of Tok, but the line would not be usable for creating an intertie to Tok. To service Tok with power would require a 90-mile intertie. A

study of an intertie for Alaska Power and Telephone estimated the cost of the tie at $250,000 per mile, making the intertie cost-prohibitive for the small amount of power that would be produced by waste heat (Don Mahon, 2000). Generally, interties are thought to be economically feasible up to 10 miles (Petrie, 2000). An Alaska Power and Telephone official suggested that in the future a power generation facility in the area could be feasible. Such a facility would need to be large (possibly as large as 10 to 15 megawatts) and would need to service a broad area to be feasible. Detailed study of such a facility would need to be undertaken to determine its potential (Mahon, 2000).

4.2 National Missile Defense Related Activity

NMD is a possible tenant for a Delta Junction area industrial park. If developed in the Delta Junction area, NMD would use much of the present facilities in the main cantonment at Fort Greely. NMD also anticipates housing requirements in excess of the existing facilities at Fort Greely (Cole, 2000). The City has been very supportive of the potential siting of NMD at Fort Greely. In February 1999, the City passed a resolution in support of development of NMD in the area.

Although NMD would make use of several buildings at the present base, it would consider use of additional facilities in an industrial park constructed by the City. Although the government has not committed to developing or locating NMD facilities at Fort Greely, if initiated, the development would be undertaken on a strict timeline. If the City makes a clear and definite offer to NMD with facilities available for use on a known date, NMD could choose to become a tenant of the City's industrial park. Given the strict timeframe that NMD would pursue, however, NMD is unlikely to become involved with the City in planning the industrial park. Instead, NMD would require the City to commit to provide specific facilities on a specific date much like a typical tenant. Consequently, any development of property by the City specifically to obtain NMD as a tenant would require the City to assume all of the risk. This risk is present at many levels. NMD may not be undertaken. If undertaken, NMD may not be located at Fort Greely. If undertaken at Fort Greely, NMD may simply choose not to use the City's park. Without a signed lease or another firm commitment from NMD to occupy a City-owned facility, the City would bear the entire risk of development.

Since the federal government is already planning building usage and considering construction needs, the City must act quickly to meet any deadline to provide facilities to NMD. This could require the City to begin planning and design before NMD is decided. Since the City would need to make facilities available by a certain date for NMD, the uncertainty of NMD as a tenant is troubling. The City has relatively little resources in comparison to the federal government. Consequently, the City's ability to facilitate funding and construction is far less certain than for the federal government. If a large federal project such as NMD is undertaken in the area, construction resources are likely to be largely taken by this activity. The costs of development should be expected to be high with the high demand for construction resources in the community. If the City plan for establishing the park is not well developed at the time that NMD commits to development at Fort Greely, NMD is likely to develop the necessary facilities without City involvement. Without a signed lease, the City will be subject to political decisions and security considerations, should the military decide that security needs require inclusion of all NMD facilities should be within the military area.

Fiber optic development by GVEA in the area is necessary for developing high-technology support for NMD at an off-base site. Development of fiber optics in the community, however, is unlikely to overcome any predilection for on-base development. Fort Greely has a fiber optic communication system, so there is no comparative advantage once this system is developed off base.

4.3 Mining-Related Activity

This section describes potential activity that may take place at Delta Junction with the construction and operation of the proposed Pogo mine. The activity at Delta Junction (particularly the industrial park use) that is related to the Pogo mine may vary significantly, depending on the choice of access mode to the mining area. The proposed access alternatives are as follows:

- A permanent road from a location on the Richardson Highway north of Delta Junction to the Pogo mine site would be constructed to enable road travel and equipment transport year-round.
- An ice road would be constructed from a location on the Richardson Highway north of Delta Junction to the Pogo mine site to enable road travel and equipment transport during the winter months only. This means of transport would be supplemented by air transport in months when the ice road is impassable.[8]

The choice of road access alternatives will influence the mine's use of facilities in Delta Junction and at the industrial park. The different roads are described first, followed by a full description of the implications for Delta Junction and the industrial park use.

4.3.1 Description of Alternatives

Two **winter road** access alternatives have been proposed, the Goodpaster River route and the Shaw Creek flats route. The Goodpaster route would be approximately 49 miles in length and would roughly follow the Goodpaster River, making nine crossings of that river and several crossings of other smaller streams. This route was used as the exploration route during the winter of 1997 and 1998. It is anticipated that this route could be constructed in approximately 30 days and would be available for use for approximately 60 days. An average of 30 to 35 trucks per day would use this route.

The Shaw Creek flats route would be approximately 46 miles in length. Because of area topography, this route would require more permanent construction. This route would require height limitations and pose some liability challenges due to the proximity of the Alyeska pipeline. This route, however, would be anticipated to be available for more days during the year than the Goodpaster route and to have fewer interruptions due to weather. Teck anticipates that this road would be available for approximately 70 days during the year. Approximately 30 to 35 trucks would use the road each day.

Both winter road access alternatives would require air transportation during times when the road is impassable. Approximately 500 flights per year would be required for transport of supplies and employees. A 5,000-foot runway at the mine site would be required for off-season deliveries to the mine. Staging and storage areas in or near Delta Junction would be required. Both winter road access alternatives would also be susceptible to weather fluctuations. Winter warming is expected to make the road temporarily impassable occasionally, and to make construction impossible in extreme years.

Permanent road access is the preferred alternative for the Pogo mine operation. This road would be built to accommodate speeds of 35 miles per hour. Approximately 4 to 5 trucks are expected to use the road each day. The road would be restricted to mine-related vehicles. During road construction, air transportation would be required for the construction of the mine. The development of an all-weather road could face challenges based on environmental harm.

[8] The Pogo mine could be operated without a road to access the mine. Under this alternative, the mine would be accessible by air transport only. Teck Resources has rejected the use of air-only access to the mine as too costly. Therefore, this discussion is limited to the two road alternatives.

The two proposed sites for an all-season road are described as the Shaw Creek hillside route and the South Ridge route. The Shaw Creek hillside route would be approximately 49 miles in length with bridges at Caribou, Giles, and Shaw creeks. The south ridge route would be approximately 46 miles in length, roughly following the ridge northwest of the Goodpaster River valley. This route has several more challenges in construction than the Shaw Creek hillside route.

4.3.2 Analysis of Alternatives

The proposed road alternatives would have different impacts on the Delta Junction community. The alternative that would benefit the Delta Junction by using an Allen Army Airfield industrial park most would benefit the Pogo mine operation least. Inversely, the alternative that would benefit Pogo most would benefit Delta Junction by using an Allen Army Airfield industrial park industrial park least. Some of the impacts of the alternatives are outlined in Table 4-17.

A winter road would enable the Pogo project to transport equipment, supplies, and employees to the mine by road for approximately 60 days during the winter season. This would cut costs that the Pogo project that would otherwise incur for air transport. Due to uncertainties associated with an ice road—for example, closings during midwinter thaws—and the short period during which the road can be used each year, this alternative would require supporting infrastructure and staging areas at Allen Army Airfield south of Delta Junction and use of the airstrip during spring, summer, fall, and periodically in winter.

If a winter road option is pursued, hourly personnel would work 2 weeks on and 2 weeks off, staff would work 5 days on and 2 days off. Hourly personnel would be transported to and from Allen Army Airfield at Fort Greely; staff would be transported to and from Fairbanks and Allen Army Airfield. The longer time off between shifts under this option could reduce the number of employees that choose to reside in the Delta area.

Table 4-17. Impacts of Road Access Alternatives to Delta Junction and Pogo Mines

Road Access	Delta Junction		Pogo Mines	
	Benefit	**Lost Benefit**	**Benefit**	**Lost Benefit**
Year-Round	Possible community mining employment Use of Allen Army Airfield during mine construction Staging area at Allen Army Airfield during construction 4-day-on/4-day-off work schedule could induce more employees to live in the Delta area.	Loss of activity at Allen Army Airfield on completion of road construction Road access will diminish reliance on support and infrastructure in Delta Junction	Relatively low operating costs Reliable transport system	None
Winter	Possible community mining employment Use of Allen Army Airfield during mine construction Staging area at Allen Army Airfield during mine construction	2-week-on/2-week-off work schedule could reduce the number of employees residing in the Delta area.	Road access lowers transportation costs	Winter road is unreliable due to thawing High summer transportation costs

Permanent road access to the Pogo mine is the preferred access alternative of Teck Resources because of its reliability and relatively low cost. This alternative would provide little benefit to Delta Junction. With an all-weather road that connects to Richardson Highway north of Delta Junction, Teck would have little need for services and support from Delta Junction. Under this alternative, hourly personnel would work 4 days on and 4 days off, and staff would work 5 days on and 2 days off. Employees would be transported between the mine and the Richardson Highway by bus. The choice of residence of these workers is uncertain since they could easily access either Delta Junction or Fairbanks by the Richardson Highway. The shorter shifts, however, could induce more employees to choose to reside in the Delta area. Some support is likely to be required during the construction stage, but any dependence on Delta Junction for staging and transportation will be lost on completion of the road.

The two alternatives have different impacts on the Delta Junction community and the choice of alternatives by Teck could influence the success of an industrial park. The only role for the industrial park in either case is as a staging area for shipments to the mine.

To assure that it receives the maximum possible benefit from development of the mine, the City of Delta Junction should stay in close contact with Teck. Close coordination with the mine could limit the exposure of the City to the risks of development of facilities for the mine. The risk to the City is that temporary structures or facilities could be acquired for use in supporting the mining activities. These facilities may be abandoned by the mine after a short period of use. If the City does not have an alternative user of the facility, the structures could become a liability for the City. This risk is of particular concern at the base, where the City could enter a long-term lease for certain facilities. The lease would likely require the City to maintain facilities and structures during the lease and return those facilities to the military in some specified condition at its expiration. Requirements such as these could expose the City to significant liability. The City must communicate closely with the Teck to limit its exposure.

4.4 Prison-Related Activity

One of the community development projects under consideration as a part of the realignment at Fort Greely includes the conversion of a part of the main cantonment to a medium security prison. Under the Final Reuse Plan, the prison would occupy land conveyed to the City under base realignment. The legislature has authorized the Department of Corrections to contract with the City for the prison. Under the authorization, the City is required to contract a third party to operate the facility.

4.4.1 Description of Activities

The prison would house more than 800 inmates. One of the possible operators has estimated that the facility would create as many as 250 jobs (Final Reuse Plan, page 10). A portion of the housing units on the base could also be used by the employees of the facility and their families. The Reuse Plan includes this use, as well as the demolition of some housing units not used by the prison. The use of these facilities by prison personnel must be part of the realignment reuse. Any such use will be complicated by the presence of lead-based paint and asbestos in the housing units, as well as potentially uneconomic utility costs.

Currently the City is involved in litigation with a possible operator for the prison. Due to the litigation and the preliminary stage of the planning of the prison, little information is available beyond that in the Final Reuse Plan. The Army and the City have reached a general agreement about buildings to be used for the prison, but a few of the buildings are still subject to negotiation. For purposes of this

report, the concern is whether the prison would require support facilities in excess of those at the prison. Because of the litigation, little information on this is currently available.

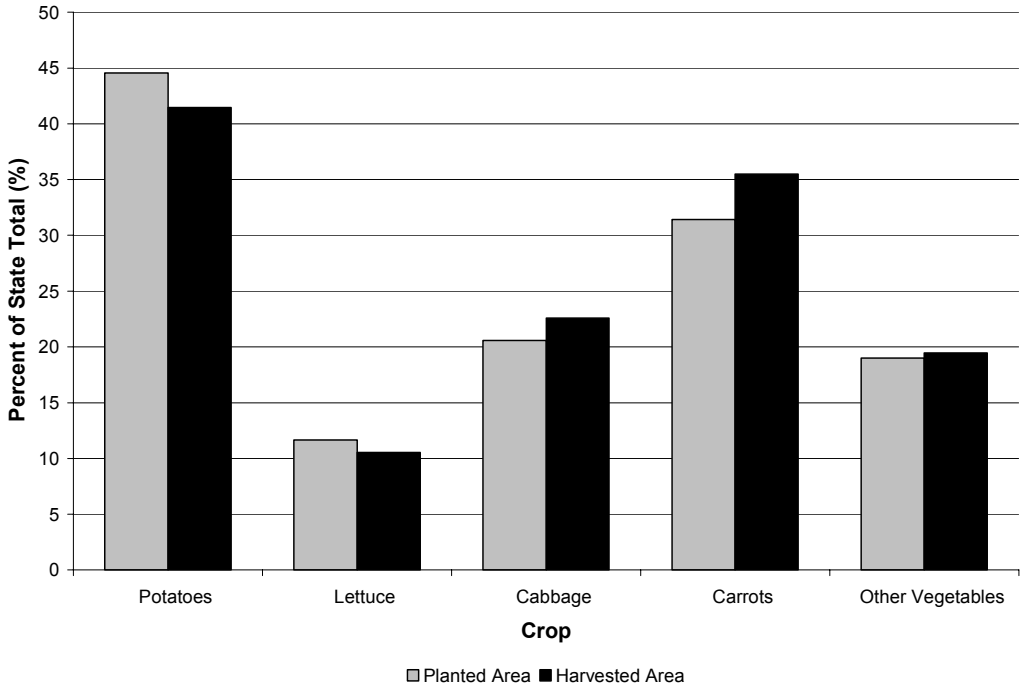
4.4.2 Site Requirements for Industrial Park Support

The prison would occupy several of the buildings at the main cantonment. Under the present plan, prison utilities could be provided by the Army using the present utilities at the base, but whether continuing to use the existing utilities would be economically feasible is unknown. The need for support facilities outside of the prison, however, is not certain. Clearly, the prison will have a requirement for storage.

4.5 Vegetable Processing

Alaska is the largest state in the union, covering 586,000 square miles. Although agriculture is practiced in many areas, farms cover only 0.2 percent of the state's land. Each year, vegetable producers in the state grow a variety of high-quality cool climate vegetables for sale in commercial markets. Relatively short summers, long hours of sunlight, good soils, and sufficient rainfall all result in short yet intense growing season. The Tanana Valley, from Fairbanks to Delta Junction, produces much of the state's barley and hogs, as well as hay, oats, potatoes, milk, and greenhouse plants and vegetables. Figure 4-7 illustrates the percentages of the land in Alaska (planted and harvested) that the Tanana Valley represented in 1998 for different crops. A vegetable processing plant is being considered for the industrial park in Delta Junction. The Delta area vegetable growers have demonstrated that they have the ability to produce and market a variety of high-quality vegetables and the processing plant could benefit from the topping plant's waste heat. The vegetables produced in the Delta can provide the primary inputs for a modestly sized plant.

Figure 4-7. Tanana Valley Percentage of Alaska Cropland, Planted Area and Harvested Area, 1998



Source: USDA Alaska Agricultural Statistics Service, 2000.

4.5.1 Description of Facility and Primary Products

Since processing plants tend to require heavy investment, facilities with more operating days to spread fixed costs have an economic advantage. Vegetables that can be stored easily will maximize the annual operating days of the facility. The Delta Vegetable Industry Feasibility Analysis (Community Visionworks, 1997a) asserts that the following vegetables have typically grown well in Alaska:

- **Potatoes.** Farmers in Alaska have shown that they are able to produce and market fresh potatoes. In 1995, Alaska farmers produced nearly half of the fresh potatoes consumed in Alaska. The largest production area of potatoes is the Matanuska Valley and the second-largest is the Tanana Valley, where production is concentrated near Delta Junction
- **Lettuce.** Lettuce is grown successfully on a commercial scale in Alaska, with about 60 acres statewide in head lettuce production in 1998. Lettuce could be produced for a processing facility throughout much of the growing season. Locally produced lettuce would have to be supplemented from outside producers throughout the year.
- **Cabbage.** Cabbage has been grown successfully for many years in Alaska. It is popular in northern latitudes as a short-season crop that is easily stored and has many uses. Seasonal markets in the area govern Tanana Valley production of cabbage but growers have indicated an interest in expanding production to meet processing needs.
- **Carrots.** Farmers in the Matanuska and Tanana valleys have a long history of producing carrots. The 1.2 million pounds produced in 1996 represented a significant share of annual consumption in the state.
- **Broccoli/Cauliflowe**r. Broccoli and cauliflower grow well in Alaska and could be produced and processed in the Delta area. They are produced commercially for fresh consumption during the summer months.

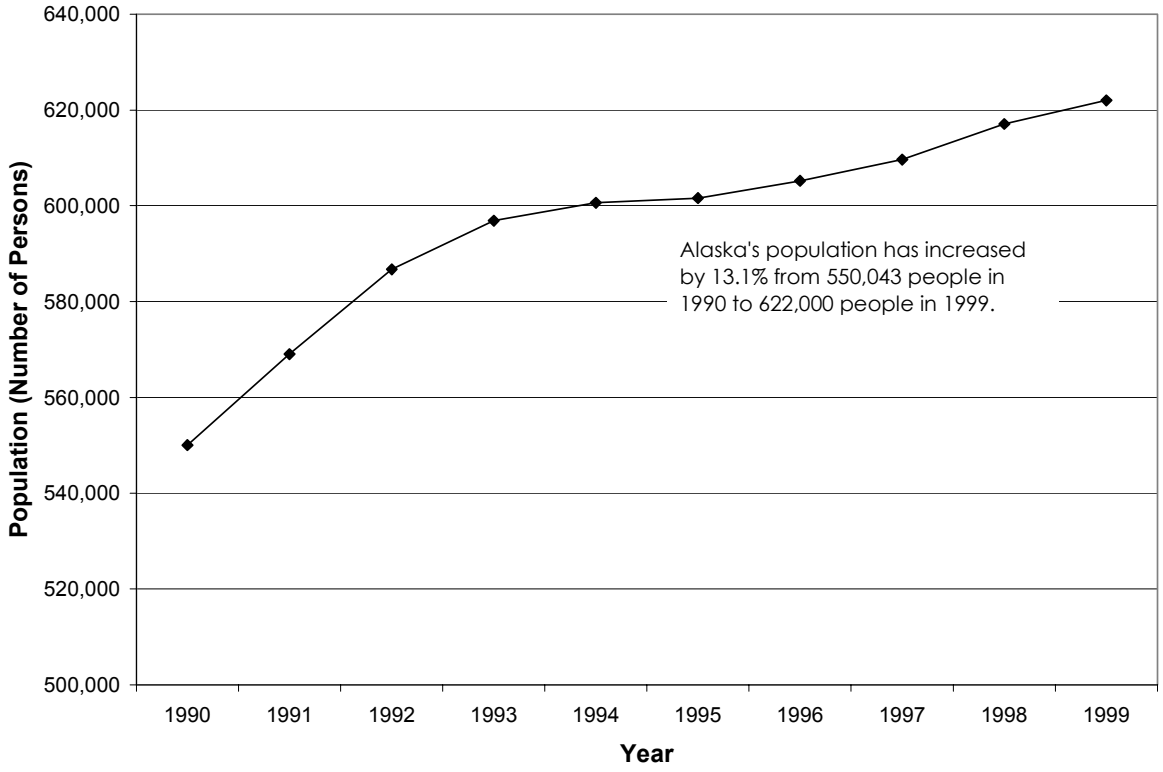
4.5.1.1 Interaction with the Topping Plant

The economic feasibility of a vegetable processing plant would be significantly influenced by its location. The facility will require heat produced internally or from an outside source. If the plant were close to the topping plant, waste heat from the topping plant could be used to generate substantial cost savings. Waste heat could be used for vegetable processing or for water and space heating. Alternatively, waste heat could be used to heat greenhouses or hothouses. Such use would be beneficial because retailers have indicated that demand exists for varieties of fruits and vegetables not typically grown in Alaska. By using waste heat to grow vegetables not characteristic to the area, area growers could market some vegetables that are not already in excess supply—creating a niche that retailers have indicated is necessary to make a processing plant a viable option. In addition, hothouses or greenhouses could be used to lengthen the growing season. The growing season in Alaska is relatively short due to weather conditions. Greenhouses would allow growers to start the vegetables earlier in the season. The additional produce generated from a longer season could capture some additional market share and substantially increase vegetable industry revenue.

4.5.2 Existing and Potential Markets

The absence of markets for the processed vegetables could be a significant obstacle to the facility. Population, income, preferences, and a variety of other factors drive markets. Alaska's population is relatively small, but Figure 4-8 illustrates that it has increased by 13.1 percent since 1990 and the DOLWD has projected that in the middle case scenario, the state's population will reach 776,488 people by 2018 (DOLWD, 2000). With the population of Alaska increasing, the demand for vegetables will increase.

Figure 4-8. Alaska Population, 1990-1999



Source: DOLWD, 2000.

Alaska markets for processed vegetable are developed, yet somewhat reliant on outside supply sources. In and around urban areas, a wide variety of good-quality vegetable products is available to consumers in canned, frozen and fresh forms. As might be expected, the farther one lives from an urban area, the more limited the choices are. The vegetable industry can be separated into three basic categories: fresh, frozen, and canned. The fresh segment has very little branding and attempts at product differentiation are limited. The canned and frozen sectors, however, include many national brands and private labels. Over the past 25 years, demand for canned vegetables has flattened or declined and many of the canning facilities have closed. During the 1970s and 1980s, frozen vegetables played a major role in the market and showed steady growth. During the 1990s, the market shifted from frozen vegetables to fresh vegetables. Today, markets for traditional canned and frozen vegetables are competitive. The fresh vegetable industry has seen the most change as a variety of trends has emerged. Therefore, fresh vegetable products are the most likely to succeed in the market.

As discussed in the September 1997 Community Visionworks report, some potential markets for vegetables are as follows:

- **Brand-Name Fresh Vegetables.** Since 1990, branded fresh vegetables have increased in popularity. Brand names are relied on to convey freshness and quality of products.
- **Precut Vegetables.** The vegetable market has seen the emergence of precut carrots, broccoli, potatoes, cabbage, and lettuce. These precut packs are convenient and popular for busy households and food service.
- **Prepared Salads.** These items are similar to the precut vegetables but are meant to be more convenient—a consumer opens the bag and adds dressing, and the salad is ready to eat.
- **Prepared Vegetable Snack Trays**. Consumers have become more health conscious than in the past. Raw vegetables have therefore become more popular as a snack food. Freshly prepared vegetable trays are convenient and are available in many retail stores.
- **Fresh Processed Products.** The goal of modern vegetable processing systems is to preserve the freshness and quality of the products while optimizing the shelf life. A wide variety of packaging methods is available.
- **Microwavable Meals.** Microwavable meals have become standards of convenience in today's society. These variations of traditional products have become extremely popular. Ranging from the classic TV dinner to vegetable blends, these products generate a great deal of demand for produce.

Because lettuce, cabbage, and carrots are vegetables that are abundantly grown in the Tanana Valley and in plenty of supply, prepared salads could possibly provide the most market potential in Delta Junction. Prepared salads have grown in popularity over the years because of their convenience. While all of the above items are possible markets for the vegetables, limited local production could force vegetable processing in Delta Junction to use the available inputs to make vegetable processing profitable.

4.5.3 Competitive Analysis

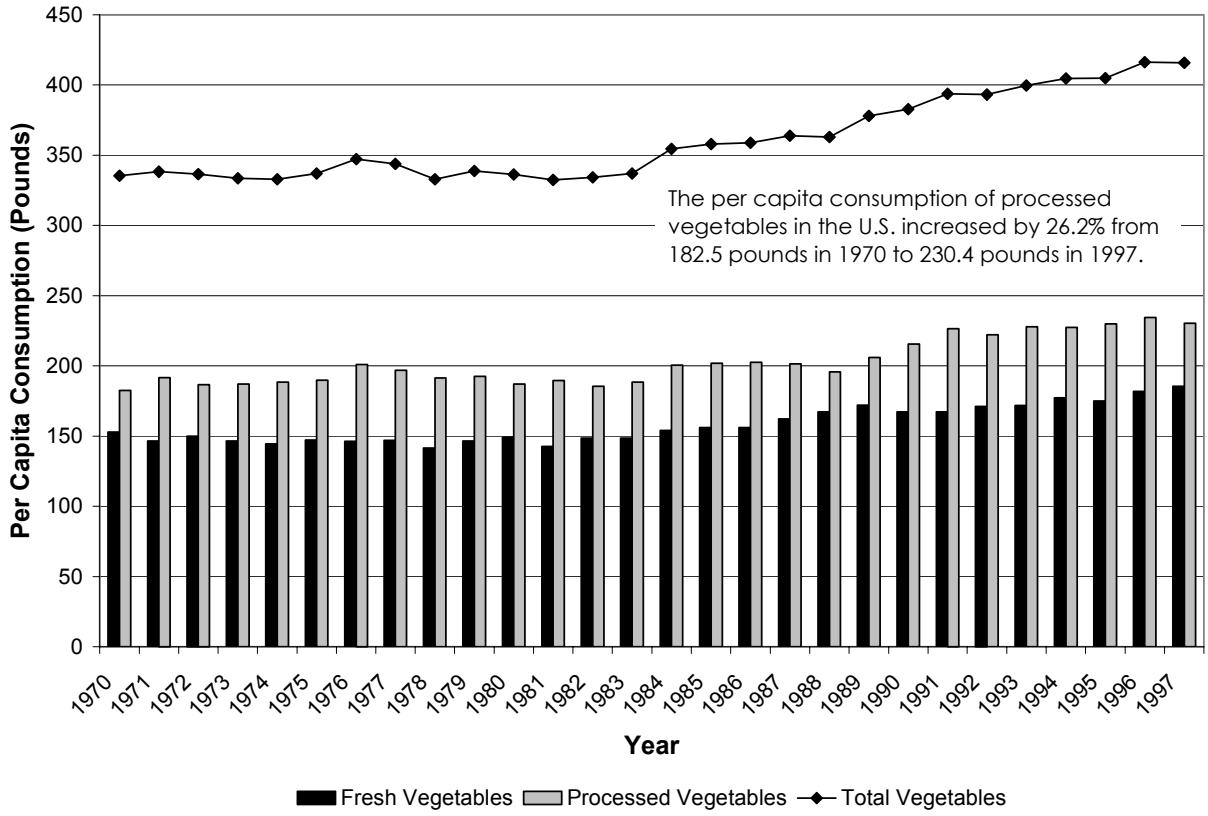
The advent of new products and the healthier attitude of today's society have generated an increase in the demand for vegetables. In fact, USDA data indicate that per capita consumption of vegetables in the United States increased by 26.2 percent between 1970 and 1997—as illustrated in Figure 4-9. This steady growth indicates that markets for processed vegetables are available. However, the markets should include value-added products including variations on the many processed vegetable products that are already on the market.

Alaska's population of 622,000 people is a viable market for vegetables that come out of Delta Junction. Using the 1997 figure for consumption of processed vegetables, 230.4 pounds per capita, to calculate the potential market demand for the Delta area produce results in a market demand of roughly 143.3 million pounds of processed vegetables per year. If the 185.6 pounds per capita consumption of fresh vegetables is considered, another 115.4 million pounds of vegetables is added to the calculated annual demand by the people of Alaska. Figure 4-10 illustrates that the total production weight from the Tanana Valley in 1998 was 3.7 million pounds—only 1.4 percent of the calculated market demand.

Figure 4-11 illustrates the production values of crops grown in the Tanana Valley from 1991 to 1998. Since these values are measures of the value of crops harvested, without taking into account waste and spoilage, care must be used in interpreting these values. The willingness of retailers to purchase

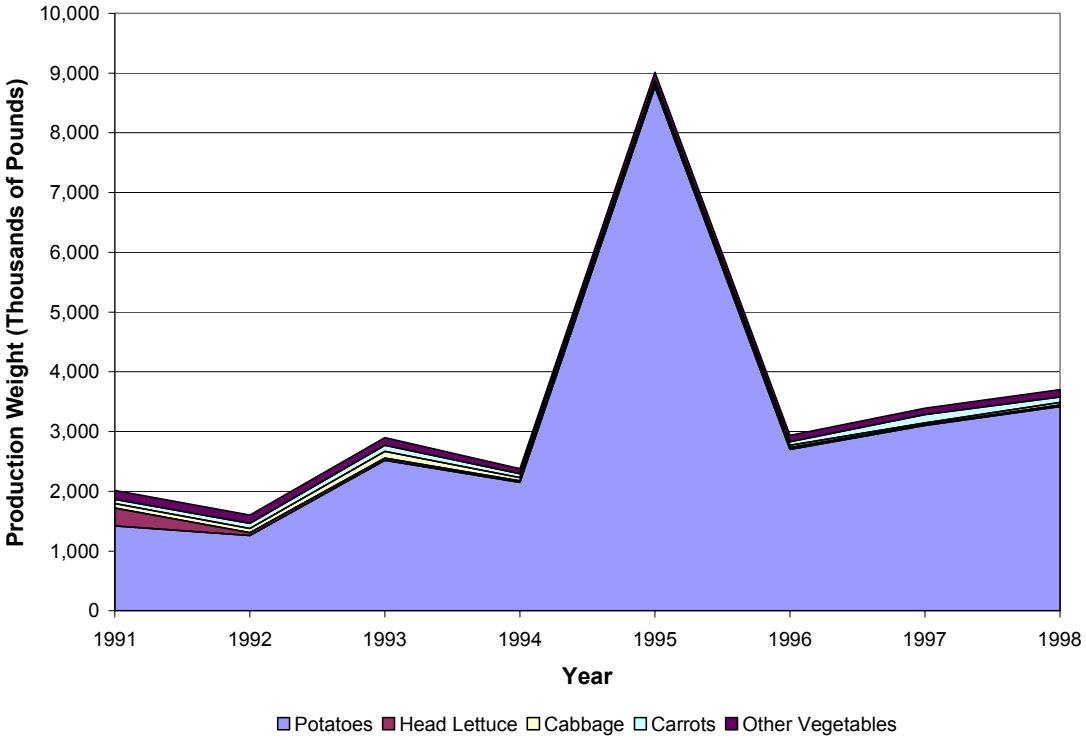
produce from local growers in Alaska has been verbalized—the focus must be on developing new and existing fresh and value-added markets and delivering high-quality produce on a consistent basis and at competitive prices.

Figure 4-9. Per Capita Consumption of Vegetables in the United States, 1970-1997



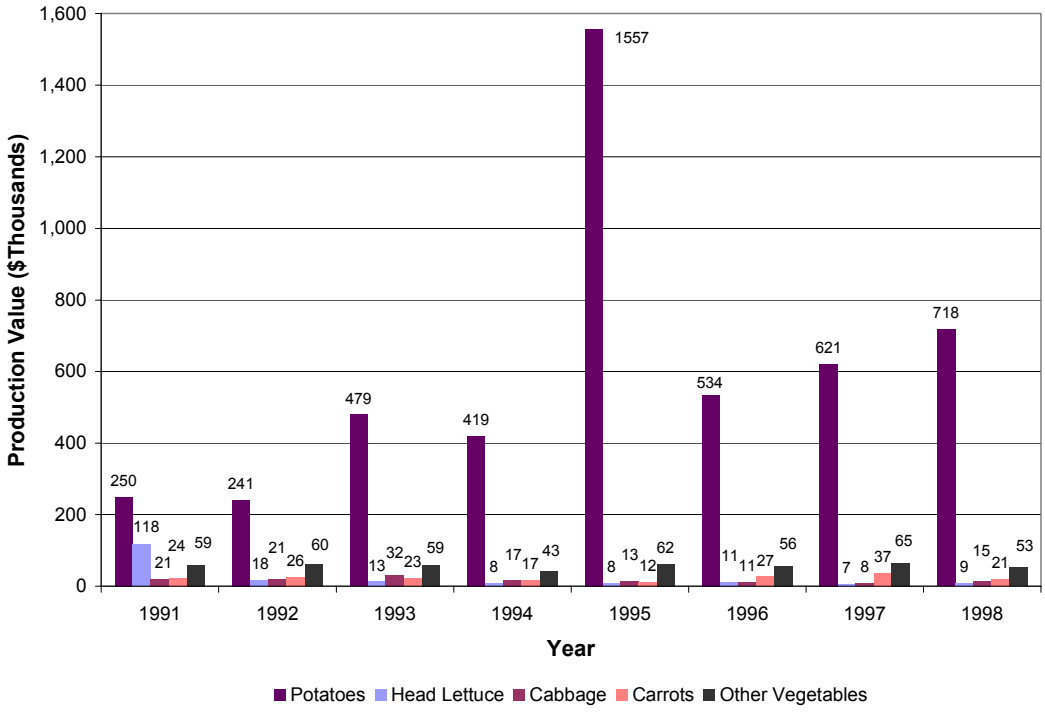
Source: USDA Economic Research Service, 2000.

Figure 4-10. Production Weight of Tanana Valley Crops, 1991-1998



Source: USDA Alaska Agricultural Statistics Service, 2000.

Figure 4-11. Production Value of Crops in the Tanana Valley, 1998



Source: USDA Alaska Agricultural Statistics Service, 2000.

Individuals representing Fred Meyer stores and Carr's/Safeway indicated that they try to purchase Alaska-grown produce whenever possible. The Safeway/Safeway representative said the company gives priority to local growers to support the local economy. Both retailers indicated that the key element would be fresh products available at an affordable price. These retailers are willing to pay a little more for locally grown produce because it would typically be fresher if delivered to the stores shortly after harvesting (Stallman, 2000, and Triggs, 2000).

The "Alaska Grown" logo was created by the Alaska agriculture industry to highlight products grown in Alaska. The program is designed to increase consumer awareness and consumption of Alaska agricultural products. The Division of Agriculture has artwork images of the logo available for producers, wholesalers, retailers, and the media to use in their efforts to promote Alaska Grown products. The use of the logo is encouraged on all local product packaging for vegetables, meat, milk, eggs, nursery products, honey, furs, and wool products. The policy is to allow the use of the logo on quality local products that meet established standards for the top two grades for the particular item. Products for which USDA or state grades are not established are evaluated on the basis of commodity or industry association guidelines. All of the food products using the logo must be 100 percent locally grown, except in the case of processed food items, which require some condiments, spices, and other miscellaneous ingredients. Processed products are required to have at least 75 percent Alaska-produced content (DNR Division of Agriculture, 2000).

Local growers must discover a unique niche in the vegetable industry. There is consensus is that there is too much competition in traditional Alaska produce. Both representatives from the Fred Meyer and Carr's/Safeway expressed the need for a larger variety of vegetables—the more common Alaska-grown products such as lettuce, potatoes, and carrots are adequately supplied. They indicated that there is a need for something other than the vegetables characteristic of the Tanana Valley.

4.5.4 Market Strategy

A vegetable processing facility in the Delta area may have to focus on both fresh and value-added processing markets including ready-made salads, precut vegetables, and freshly processed products, as well as vegetables that are not typically grown here in Alaska. The Community Visionworks report indicated that these markets could be profitable with a high-quality and well focused processing facility. Individuals representing Fred Meyer stores and Safeway/Safeway indicated that they do try to purchase Alaska-grown produce whenever possible. Both retailers indicated that the key would be fresh products available at an affordable price. The retailers are willing to pay a little more for locally grown produce because it would typically be fresher if delivered to the stores shortly after harvesting (Stallman, 2000, and Triggs, 2000).

A number of small processors currently succeed in these markets in many parts of the country, including Alaska. For example, Alaska Fresh Cuts based in Anchorage sells prepackaged salads and carrot sticks all over the state. In most of the successful examples, the processors reliably sell good quality products. They operate under the premise that the success of the operation is dependent on keeping its customer base by consistently delivering a fresh, high-quality product. It is also essential to continuously develop ways to improve existing products or add to the product line. (Community Visionworks, 1997a).

4.5.5 Conclusions and Recommendations

In a September 1997 report, Community Visionworks did a comprehensive analysis on the economic feasibility of a Delta Junction Vegetable Processing Facility and presented several scenarios.[9] The report's recommended scenario would result in the Delta Fresh Vegetable Cooperative operating at a small profit by the second year. Profits would improve modestly through the fifth year. The cash position would be adequate at its low point and improve thereafter. Given these results, the report found the venture economically feasible (Community Visionworks, 1997a).

Facility construction could be financed in a number of ways and should be explored further. The City might be able to get a federal grant from the Economic Development Association for construction of the building, and they might be able to get inexpensive loans from the USDA for the necessary equipment. If a group of farmers in the Tanana Valley were willing to cooperatively supply the necessary inputs, the facility could be developed inexpensively. Development of such a cooperative could be difficult, given resistance that farmers have shown recently to organizing. Whether sufficient markets can be established for the facility's output is a concern.

The development of a commercial composting facility on a portion of the surplused property at Fort Greely has been under consideration for some time. If that facility is developed, a vegetable processing facility in the area may be able to develop a beneficial relationship with such a compost facility. The vegetable processing facility might be able to provide waste to the composting facility. Compost from the composting facility could be useful for vegetable production in the area. If the composting facility is developed, a vegetable processing facility should consider the advantage of locating near that facility in choosing a location.

The profitability of a vegetable processing facility in Delta Junction is dependent on several assumptions:

- The facility would have to focus on fresh and value-added processing markets including, but not limited to, ready-made salads, precut vegetables, and freshly processed products, and on vegetables that are not typically grown in Alaska. The Community Visionworks report indicated that these markets could be profitable with a high-quality and well-focused processing facility. The vegetables already grown in Alaska are abundantly supplied—markets are interested in different kinds of produce that are not typically grown in the area.
- Retailers try to buy locally grown products whenever they have the opportunity. Individuals representing Fred Meyer stores and Safeway/Safeway indicated that they do try to purchase Alaska-grown produce when it is available.
- The processing facility would most benefit significantly from locating near the topping plant to use waste heat. Waste heat from the plant could be used to heat the vegetable facility. Alternatively, waste heat could be used to heat greenhouses or hothouses, either of which could be used to extend the relatively short growing season or produce vegetables not commonly grown in Alaska.

4.6 Forest Products Processing

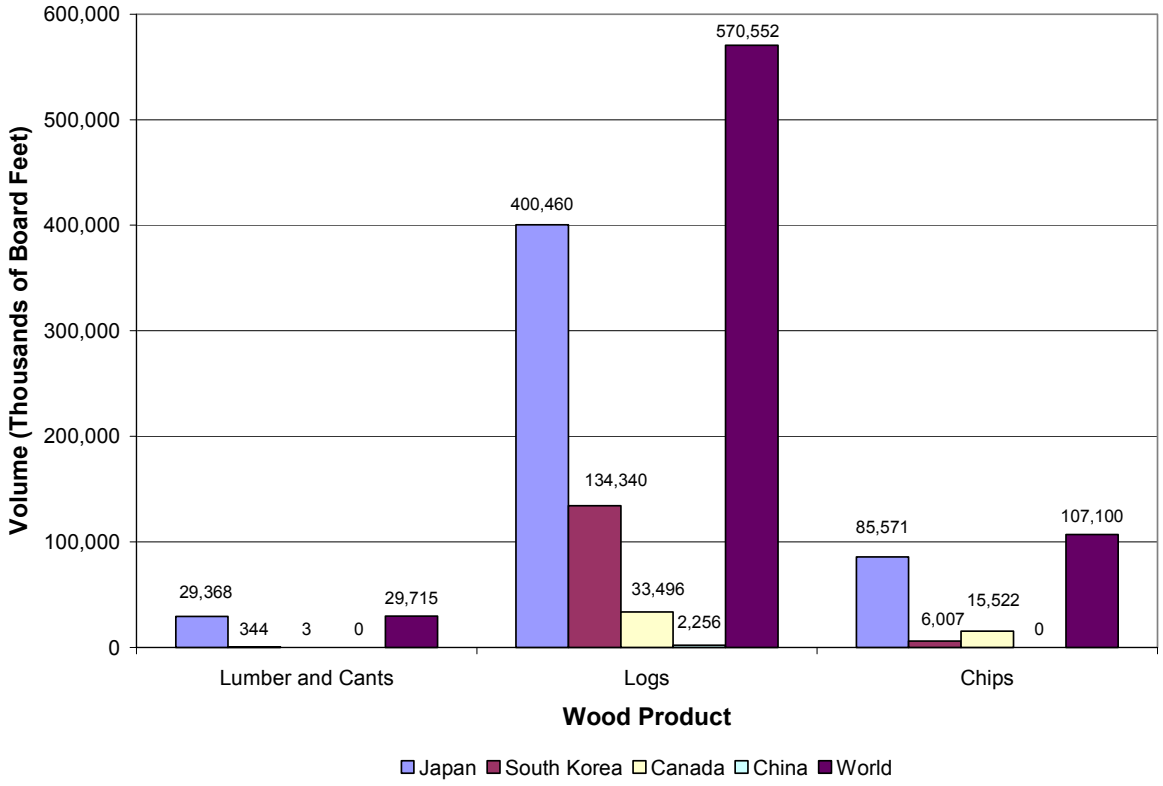
A possible tenant for the industrial park is a forest products processing facility. In 1997, Community Visionworks examined the potential of a wood processing facility for the Delta Greely Community Coalition in its report titled *Other Economic Development Opportunity Analysis*. This section uses material from that report.

[9] For the detailed analysis of these scenarios and the various underlying assumptions, that report should be consulted.

Forest products are an important contributor to the Alaska economy. Until recently, the majority of harvests of Alaskan timber were from coastal forests in Southeast Alaska. In recent years, commercial timber harvests in Southcentral Alaska have increased. In the Interior, harvests have lagged as the mix of white spruce, black spruce, aspen, and birch found in Interior forests has complicated harvesting and processing, reducing commercial values. Recent market and technology changes have potential to increase the value of these forests, making their harvest commercially feasible.

Alaska has approximately 100 commercial sawmills and secondary manufacturers. These range from 10- to 20-acre mills producing more than 1 million board feet (mmbf) of products annually (a few produce 25 mmbf or more) to small, mobile dimensional mills that process wood from national and state forests for personal use. Alaska mills produce a wide range of products, but most output is primary processing. Products include large cants and flitches, shop lumber used in remanufacturing, dimensional lumber, railway ties, shakes and shingles, music wood, and a host of specialty and craft products. Figure 4-12 illustrates international exports of Alaska wood products in fiscal year 1997.

Figure 4-12. Exports of Alaska Wood Products by Destination, Fiscal Year 1997

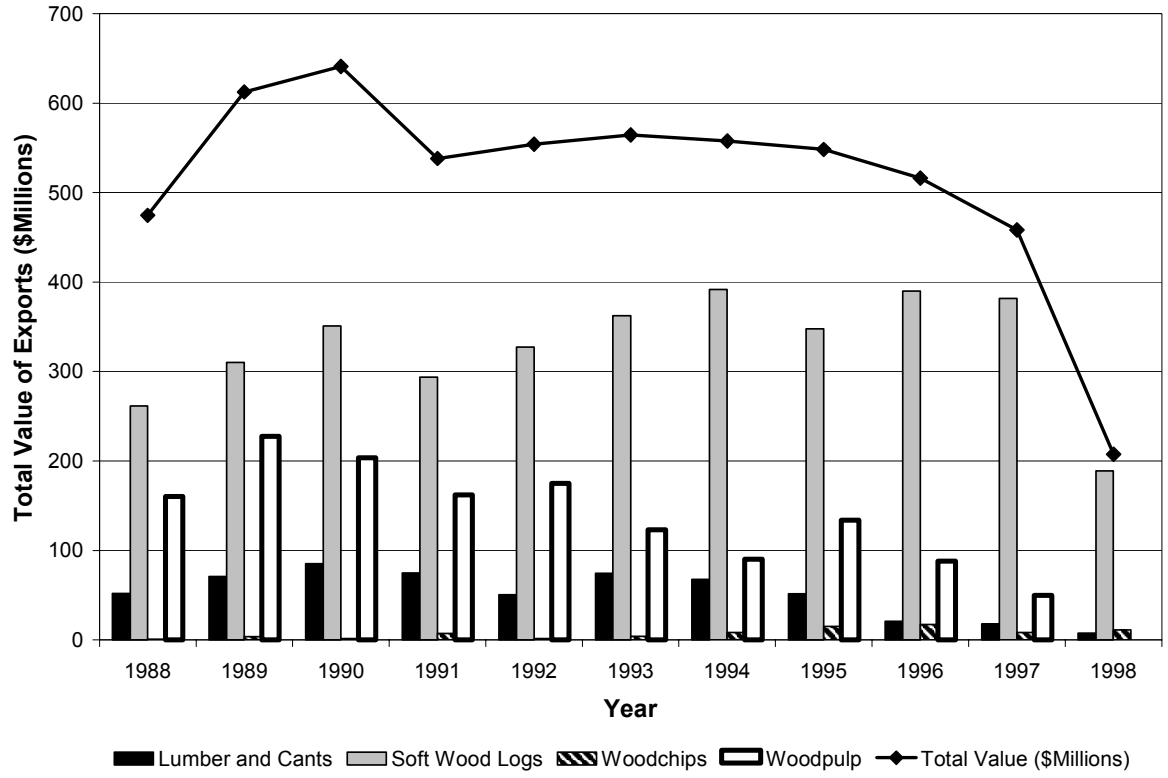


Source: DCED, 2000.

4.6.1 Existing and Potential Markets

As with vegetable processing, the small Alaska population constrains the sale of wood products. The wood products industry is composed primarily of small sawmills, house log manufacturers, and fuel-wood producers. A feasible processor must find space in the existing Alaska market selling products already produced here, enter the Alaska market with a new product, or enter the market for a product to be shipped outside Alaska. Figure 4-13 shows international exports of Alaska wood products, for fiscal years 1988-1998.

Figure 4-13. International Exports of Alaska Wood Products, Fiscal Years 1988-1998



Source: DCED, 2000.

A wood processing plant in Delta Junction could focus on one or more of several products. The facility should be capable of handling the low-grade timber abundant to the area. Products that use low-grade inputs are:

- **Wood Heating**. An industrial wood fuel market would provide a sizable opportunity to use lower grade timber found in the Tanana Valley.
- **Plywood or Flakeboard**. A minimum sized plywood or flakeboard plant would need about 5 mmbf per year of either softwood or hardwood inputs.
- **Pulp Mill.** Some timber in Delta Junction has fiber that may be used for papermaking. A small mill could use these inputs to produce pulp.

Since the Delta area forests also contain some high-quality timber, products capable of using these higher quality inputs should also be considered. Some products that would use the higher-grade inputs are as follows:

- **Milled Products and House Logs**. A small processor of milled products and house logs could use high-grade timber from the area. Alaska markets and export opportunities for these products are expected to improve.
- **Treated Wood Products.** A wood treating industry could produce treated wood products as material for bridges, decks, fences, retaining walls, landscape timbers, building poles, laminated beams, and so on.
- **Laminated Veneer Lumber**. To date, most laminated veneer products in the U.S. and Canada use softwood species, but hardwood species could be acceptable for many uses (Community Visionworks, 2000b).

As a general trend, the forest products industry in Alaska has shifted away from the processing of primary products toward value-added processing. This change in the industry could create an opportunity for increasing harvests and processing activity in interior Alaska, particularly the Delta area (DCED, 2000). These changes favor processing facilities such as a pulp mill or a plywood or flakeboard processing mill.

4.6.2 Timber Supply

The timber supply in Alaska, and particularly in the Tanana Valley, may be separated into four sources: forests owned by the federal government, state government, Native American corporations, and other private owners. Figure 4-14 shows the percentages of Tanana Valley land owned by these types of owners.

Because of environmental pressures, timber supply from federal forestland is very unreliable. The present trend is for the withdrawal of federal lands from harvest. In recent years, changes in forest regulations affecting federal forestlands have stressed the industry. In southeast Alaska, the National Forest Service has drastically reduced harvests in the Tongass National Forest. The Forest Service has also implemented significant reductions, but of a smaller magnitude, in the Chugach National Forest in Southcentral Alaska. Table 4-18 summarizes federal timber sales in fiscal year 1998.

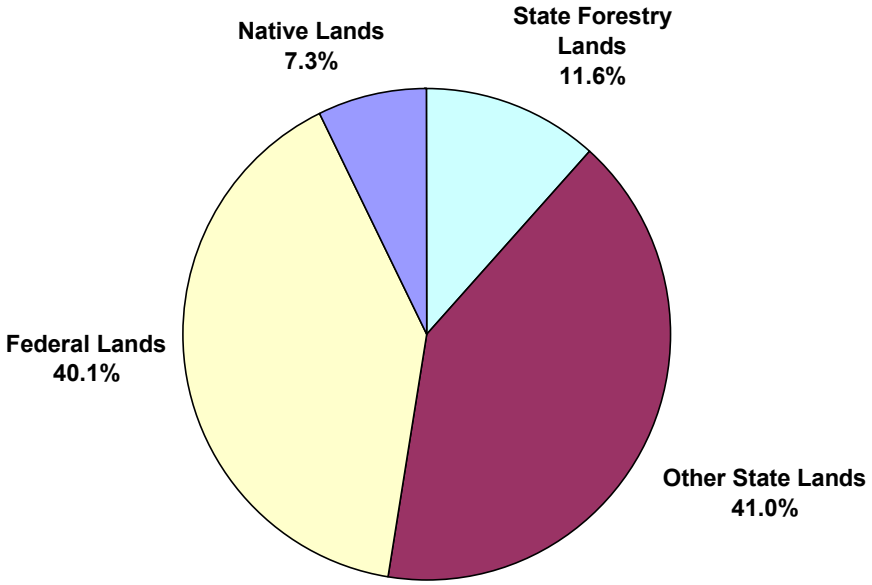
In Alaska, 24.9 million acres of forestland holdings are state forestland. These lands include both state public domain land and designated state forestlands. Only 4.3 million acres of these holdings are considered commercial. The two designated state forests, at Haines and in the Tanana Valley, contain just over 2 million acres of forestland. The larger of these forests, Tanana Valley State Forest, contains roughly 1.8 million acres of forestland, including substantial holdings in the Delta Junction area (DCED, 2000).

Harvest of timber from state lands is subject to constitutional sustained yield limitations, the state public land planning process, and budgetary concerns. In recent years, harvests on state lands have averaged approximately 30 million board feet annually.

Table 4-19 summarizes fiscal year 1998 State of Alaska timber sales. Future timber sales from state lands should rise as new legislation provides for negotiated timber sales. Before timber sales, forestlands must be designated for timber management. These designated forestlands are then subject to Forest Land Use Plan and a Five-Year Timber Harvest Schedule. Plans and schedules are open to public review and comment before sales (DCED, 2000).

Private forestland in Alaska is primarily in ownership of Native American corporations, who have a total land base of approximately 40 million acres. Approximately 2 million acres of this land is in the Interior and produces commercial quality timber.

Figure 4-14. Tanana Valley Land by Type of Ownership



Source: DNR Division of Forestry, 2000.

Table 4-18. Federal Timber Sales in National Forest Areas, Fiscal Year 1998

National Forest	Total Sold (mbf)	Total Sold (mcf)	Sawtimber Sold (mbf)	Sawtimber Sold (mcf)	Volume Under Contract (mbf)	Volume Under Contract (mcf)
Chugach	232	46	98	20	992	198
Tongass, Chatham Area	770	154	580	116	51,848	10,370
Tongass, Ketchikan Area	8,865	1,773	7,213	1,443	223,486	44,697
Tongass, Stikine Area	14,416	2,883	14,000	2,800	119,703	23,941
Total	**24,283**	**4,857**	**21,892**	**4,378**	**369,029**	**79,206**

Source: USDA Forest Service, 2000.
mbf = thousands of board feet
mcf = thousands of cubic feet

Table 4-19. Timber Sales on State Land by Area, Fiscal Year 1998

Area	Sales Offered			Actual Sales		
	No. of Sales	Acreage	Volume (mbf)	No. of Sales	Acreage	Volume (mbf)
Copper River	2	560	6,015	2	560	6,015
Delta	8	906	4,581	7	406	2,831
Fairbanks	27	1,511	11,590	10	625	3,864
Haines	10	616	5,291	8	593	4,786
Juneau	13	195	4,920	13	195	4,920
Kenai	5	3,117	17,710	4	3,046	17,381
Ketchikan	13	184	4,917	13	184	4,917
Mat-Su	3	1,019	580	2	960	373
Southwest	2	30	122	-	-	-
Tok	1	62	500	1	62	500
Total	**84**	**8,200**	**56,226**	**60**	**6,631**	**45,587**

Source: DCED, 2000.

4.6.2.1 Tanana Valley Forestland

Boreal forests in the Interior of Alaska are composed of birch, aspen, black spruce, and white spruce. Figure 4-15 illustrates the vegetation found in the 738,352 acres of forestland in the State of Alaska's Delta management area. Although this acreage includes only state forestlands, other forestland in the area is likely to have similar species mix.

High-quality birch in the Tanana Valley is valuable for uses such as veneer and flooring. In interior Alaska, several small processors are presently competing for high-quality birch. These trees are typically interspersed with both lower quality birch and other species. Although low-quality birch is usable for fiber, most harvesters attempt to harvest only high-quality timber. This harvesting strategy is complicated and more costly because of this mix of species and qualities. The selective harvest of high-quality timber alone is competitively pursued in the Delta area. The market is thought to be saturated. In addition, the scale of this type of harvest could be limited as harvests are typically inadequate to support the development of roads necessary to expand the practice (Joslin, 2000).

The competition for high-quality birch, the poor road access to forests, and the complexity of harvesting only high-quality birch in mixed forests all tend to favor harvest and processing strategies that utilize larger quantities of lower quality timber. Harvest of these low-quality woods will also lead to increased harvests of the higher quality birch, which can be sorted throughout the harvest.

White spruce is also common in the Tanana Valley. In its best use, white spruce is of the greatest commercial value. Its long fibers are good for producing high-quality papers, and because of its light color, it requires little bleaching. Because of its relative abundance, a small pulp mill that processes white spruce could present good market opportunity for the forest products industry in the Delta area. A small pulp mill could process approximately 300 tons of timber each day. Such a mill is large in comparison to the existing processors in interior Alaska, but is small relative to other pulp mills.

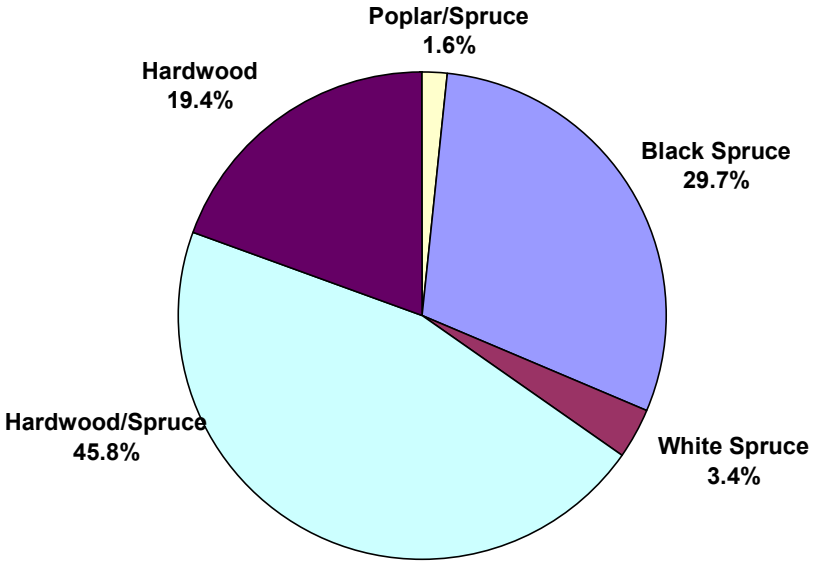
The Tanana Valley is composed of 28.4 million acres of state, federal, and private land. Figure 4-15 shows the ownership of these lands. Decreases in timber harvests on federal land have forced reductions in the processing industry in Southeast and Southcentral Alaska. In those areas, harvesting

efforts have refocused toward state and private timber supplies. Although a potential processor should not ignore the federal timber that is available, the decline in harvests of federal timber suggests that other sources of timber should be sought for processing inputs.

The Alaska Division of Forestry is drafting a new plan and harvest schedule for the Tanana Valley. The proposed 5-year schedule provides for harvest of approximately 4.2 million cubic feet of white spruce, about 14 percent of the estimated Delta area sawlog sustained yield for white spruce. According to the plan, the sustained yield for all species in the Delta area over a 10-year period is estimated to be 122.8 million cubic feet (covering 54,711 acres) (Parsons & Associates, February 2000). As the chart illustrates, more than 50 percent of land in the Tanana Valley is state-owned. Approximately 12 percent of the area is state forestland. New state initiatives favoring negotiated timber sales suggest that the processing facility should target these lands for its supply of timber.

The availability of public lands for timber harvest is subject to both political and budget pressures. Consequently, to rely solely on state land for inputs to a forest products facility carries risks. To assure an adequate supply of timber for the proposed processing facility, private sources should also be sought for timber supply. Relying on a combination of federal, state, and private lands for timber supply will minimize the risk of inadequate supplies at the facility.

Figure 4-15. Delta Management Area by Vegetation Type



Source: DNR Division of Forestry, 2000.

4.6.3 Competitive Analysis

Changes in the international wood markets combined with technological advances in processing, have increased the value of forest timber in Alaska's interior. Advances in processing technology now permit the use of medium- and low-grade logs in a variety of products. This change has a great effect on the prospects for a mill in the Delta because of its present mixed forest. Steve Joslin of the DNR Division of Forestry indicated that the best potential for the Delta Junction area is most likely a value-added processing facility using the low-grade timber. These possible facilities would include a small pulp mill or a flakeboard or plywood processing facility. These types of facilities would be able to utilize the area's plentiful supply of lower quality timber. For example, a small pulp mill would process approximately 300 tons of timber per day. Although this production volume is large relative to the present processing facilities, it is small for a pulp mill.

4.6.4 Market Analysis

For any wood processing facility, an extensive analysis of the market must be undertaken. Certain conditions must be satisfied for the successful introduction of a wood processing facility to the Delta Junction area. First, the market area for the outputs must be identified. Changes in export trends suggest that flakeboard, plywood, or pulp produced by a mill in the Delta area could be shipped outside of the state (Community Visionworks, 1997b). The barrier to the development of distant markets however is transportation. An extension of the Alaska Railroad to Canada that would connect to the Lower 48 could address this problem. Rail is often used as a low-cost method to ship forest products (Joslin, 2000). Unfortunately, development of this rail connection may not occur and is several years in the future in any case.

A second requirement for the operation of a wood products facility is a reliable, long-term supply of timber. This supply could be achieved by relying on all types of local forest owners. A large mill (such as a small pulp mill) located in Delta Junction would be able to use local timber, as well as timber from the Fairbanks, Tok, and Copper River areas. The potential sustained yield volumes set out in the Delta 5-year schedule are at most 25 percent of the potential supply available to a mill requiring fiber or chips. Since federal and state owners tend to be subject to political pressure, the private market, particularly the Native American corporations must be utilized.

A wood processing facility also requires an adequate supply of energy for its processes. Two sources for this energy are possible for the Delta Junction area. First, the topping plant could provide waste heat to the facility. Similar to the proposed vegetable processing unit, locating the wood processing unit near the topping plant could help reduce costs. Wood processing units typically have large energy requirements. Kilns are used to dry wood, water and space heat are required, and depending on outputs, other energy intensive processes are often required. Substantial benefits can be gained by reductions in energy costs. Waste wood is typically burned to satisfy some energy requirements. Plants that process lower grade timber typically produce less wood waste. If the facility were located close to the topping plant, diesel fuel from the topping plant could be used to supplement wood waste.

Alternatively, the introduction of natural gas to the area by the development of the natural gas pipeline may alleviate any energy concerns at the mill (Joslin, 2000). The uncertainties associated with these sources of energy suggest that the plant should initially rely on existing energy sources. The facility, however, should be designed to accommodate alternative energy sources, should they become available.

5 Conclusions and Recommendations

This section briefly presents conclusions and recommendations about development of the industrial park and its potential tenants. The points made in this section are described more fully and enumerated in the analysis discussed in Section 4.

5.1 General Conclusions and Recommendations

- On-base sites are particularly appealing for their access to the airfield.
- Off-base sites are appealing because of the absence of restrictions on property use.
- The City should negotiate for the removal of all environmental hazards from Fort Greely property (including lead paint and asbestos from base housing) before accepting that property from the DoD. This agreement could be with DoD or a tenant for the property.
- The City should minimize risk associated with building ownership and management obligations.
- The City might consider the lease or acquisition of land from DoD for use as an industrial park before obtaining tenants for the park. If taking this course, the City should consider applying for grants to fund the preparation of the site for development. The availability of land along with the funding of site preparation may induce businesses to locate at the park.
- Development of the park should only be undertaken with firm, long-term commitments from tenants for the expected life of the structures on the property. The City should not take on an obligation to maintain property without tenants.
- A location near the pipeline is preferred for the development of the topping plant for the access provided to feedstock crude oil. A location near Pump Station No. 9 could further reduce the cost of feedstock crude oil and provide a market for some of the output of the topping plant.
- By communications with potential economic development interests (including the manager of the proposed Pogo Mine, representatives of National Missile Defense, and representatives of Alaska Power and Telephone), the City should attempt to entice new residents to Delta Junction.
- The City should explore measures such as annexation and payments in lieu of taxes to obtain revenues from potential economic development in the community.
- The City should not be a direct participant in capital-intensive development.

5.2 Refinery

The development and operation of a topping plant could be economically viable at current feedstock prices, product market prices, and design production levels and specifications.

- Product demand in the target market is less than the output of a 20,000 bpd unit.
- Large consumers (such as the military) command lower prices and can create volatility in the market.
- Consider a small refinery to offset the risks of a small and competitive market.
- The topping plant should not expect to capture the entire target market and should be prepared for large fluctuations in price and volume demand.

- Before development, the topping plant should establish a relationship with one or more wholesale distributors or retail outlets to assure itself a share of the market. Alternatively, the topping plant should be capitalized to a level that allows its owner to purchase a wholesale distributor or retail outlet.
- Obtain from an engineering specialist further information for capital and operating costs for the facility

Competitive responses of existing refineries cannot be foreseen and could lead to negative returns for the topping plant.

- Existing refineries have competitive advantages in economies of scale and Native preference.
- Projected profits of the proposed refinery are sensitive to sales of less than 85 percent of maximum production and price reductions of 12 percent.

Changes in environmental regulations or the availability of natural gas in the target market (as a substitute for the plant's output) could affect the economic viability of the plant.

- Stay informed on the status of the environmental regulations and build to currently binding regulations.
- Stay informed on the status of development of the natural gas pipeline.
- Conduct a detailed risk assessment to determine the risks posed to the plant by changes in the market.

5.3 NMD-Related Activity

- Because Fort Greely has fiber optic facilities, fiber optic development in the community will have little influence on the City's ability to serve NMD needs.
- Development costs of a facility to support NMD activity may be very high due to the need for high technology at the facility.
- Development of a facility to support NMD activity will require adherence to very strict timeframe to have the facility available for NMD when needed.
- The City should maintain close communication with NMD officials to determine whether the City can satisfy any of the needs of NMD development.
- The City should not take on any risk related to NMD development: the costs of that development are likely to be high and political uncertainty that might affect development is very high.

5.4 Mining-Related Activity

- If an all-weather road (the preferred alternative) to the mine is developed, the mine could use facilities at the Allen Army Airfield for air supply to the mining site during construction of the mine.
- If a winter road to the mine is developed, the mine could use facilities at Allen Army Airfield for air supply to its mining site during construction and operation.
- The City should maintain close communication with Teck Resources to ensure that it has the opportunity to satisfy staging requirements for Teck.

- The City should avoid entering a long-term lease for Allen Army Airfield facilities that are intended to support Teck Resources only during mine development. Such a lease could expose the City to significant liability for maintaining the property for the life of its long-term lease.

5.5 Prison-Related Activity

- Prison-related activity will be concentrated in the area of the prison
- All prison support should be onsite and consolidated in a single agreement at initiation of the process.

5.6 Vegetable Processing

- Waste heat from a topping plant would be useful to heat greenhouses or hothouses that would extend the growing season and allow growth of vegetables not commonly grown in Alaska.
- There is little excess demand for vegetables traditionally grown in Alaska.
- A small processing plant producing products unique to Alaska could be economically viable.
- The City should consult local farmers to develop production of vegetables unique to Alaska.
- After support of local farmers is evident, the City should seek funds from EDA, USDA, and other sources for development of a vegetable processing facility.

5.7 Forest Products Processing

- The present energy supply and transportation infrastructure in the Delta Junction area could be inadequate to support the development of a large forest products processing facility
- Small specialty forest products companies, such as log homebuilders, may be economically viable, but the market for these products is highly competitive.
- Waste heat from a topping plant would be very useful to a forest products processor for drying of materials and other processes.
- The City should encourage small-scale, value-added processing and manufacturing of forest products.
- The City should advertise the availability of resources to support forest products processing in the area to both large and small forest products firms.

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