

**SUSITNA  
HYDROELECTRIC PROJECT**

**FEDERAL ENERGY REGULATORY COMMISSION  
PROJECT No. 7114**

**RAILHEAD ANALYSIS REPORT  
FOR THE SUSITNA  
HYDROELECTRIC PROJECT**

**PREPARED BY  
FRANK ORTH & ASSOCIATES, INC.**

**UNDER CONTRACT TO  
HARZA-EBASCO  
SUSITNA JOINT VENTURE**

**FINAL REPORT**

**JUNE 1985  
DOCUMENT No. 2926**

***Alaska Power Authority***

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**NOTICE**

**ANY QUESTIONS OR COMMENTS CONCERNING  
THIS REPORT SHOULD BE DIRECTED TO  
THE ALASKA POWER AUTHORITY  
SUSITNA PROJECT OFFICE**

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## 1.0 INTRODUCTION

### 1.1 PURPOSE

The objective of this report is to provide information on the anticipated socioeconomic impacts resulting from the location of Susitna Hydroelectric Project rail facilities in or near the community of Cantwell. It has been prepared in order to support the needs of the Social Sciences Program of the Susitna Hydroelectric Project of the Alaska Power Authority. This report will serve as an update on information provided in the License Application to the Federal Energy Regulatory Commission.

### 1.2 ORGANIZATION

This report contains six chapters. Chapter 1 discusses the purpose and the organization of the report. Chapter 2 describes the general methodology used to project the economic, demographic, and other effects of the railhead facilities on the community of Cantwell. Chapter 3 describes the existing rail facilities at Cantwell and Chapter 4 presents a description of the planned rail facilities. Chapter 5 contains a brief discussion of baseline socioeconomic conditions in Cantwell. Chapter 6 describes the projected effects of the facilities on employment, business activity, population, housing, public facilities and services, and fiscal resources in Cantwell.

## 2.0 METHODOLOGY FOR PROJECTING IMPACTS

This chapter summarizes the methodology used to develop projections of socioeconomic characteristics for Cantwell. For purposes of this report, Cantwell is defined as the townsite area, the area surrounding the junction of the Parks and Denali Highways, and the Draschner subdivision. Projections for a set of baseline and with-project alternatives are described.

The baseline projections of population, households, public facilities and services conditions, and fiscal conditions were taken from socioeconomic projections developed in FY84 (Frank Orth & Associates, Inc., March 1984c). Baseline projections of employment in Cantwell were derived from information contained in surveys of households and construction workers in Cantwell and from surveys of businesses operated out of Cantwell (Frank Orth & Associates, Inc., March 1984b and July 1984f; Harza-Ebasco; February 1985 and May 1985).

Several steps were taken to produce employment, population, household, public facility and service, and fiscal projections for the with-railhead conditions. First, the direct employment requirements for construction and operation of the railhead facilities were determined from information contained in the FERC License Application (Alaska Power Authority, 1983) and revised work force data (Harza-Ebasco Susitna Joint Venture, personal communication, March 1985).

Secondary employment is created when income received by the direct workers is spent in Cantwell. The secondary work force associated with the direct railhead work force was determined by applying a secondary employment multiplier to the number of construction and operations workers in each year. For this study, the secondary employment multiplier for the railhead facility in Cantwell was 0.2. It represents the value that was applied to the railhead workers and direct damsite project workers residing in Cantwell in the Susitna socioeconomic impact model in FY84 (Tuck, B.H., 1980; Frank Orth & Associates, Inc., 1984d). Adding secondary employment to direct employment provided an estimate of the employment impact of the railhead facilities on Cantwell.

Next, the origin of the workers in the direct and secondary employment categories was derived from surveys of Alaska construction workers and from labor force conditions expected to exist in Cantwell (Frank Orth & Associates, Inc., March 1984d; Frank Orth & Associates, Inc., July 1984f; and Harza-Ebasco, April 1985). These origins assume that labor force conditions in Cantwell will be loose enough to allow some Cantwell residents to obtain jobs on the railhead.

About 15 percent of the railhead construction workers were assumed to be local residents of Cantwell. According to surveys conducted of construction workers on the Cantwell portion of the Anchorage-Fairbanks Intertie Transmission Line, between 7 and 11 percent of the Intertie Project work force living in Cantwell were local residents at the time of the two surveys (Frank Orth & Associates, Inc., 1984f; Harza-Ebasco, April 1985). However, the percentage of railhead workers who would be local residents was raised for two reasons: 1) other surveys of construction workers have shown local resident hiring to be as high as 40 to 70 percent (Mountain West Research, 1975 and U.S. Corps of Engineers, 1981); and 2) nineteen Cantwell residents in the 1983 household survey had relevant skills to work on railhead construction (Frank Orth & Associates, Inc., 1984b). Because the latter survey included only 35 percent of all people in the community, additional residents in the community are probably qualified to obtain jobs related to railhead construction. While the results of the referenced construction worker surveys are either not site-specific or based on large sample sizes, the results of all the surveys taken together, suggest that 33 (15 percent) is a reasonable estimate of the number of railhead workers that would be local residents in 1986.

During railhead construction in 1985 and 1986, it was assumed that 93 percent of the nonlocal workers would be unaccompanied by dependents given the short-term nature of the construction period and the provision of single-status housing by the Alaska Power Authority. In 1985, this assumptions would mean that 147 of the 158 nonlocal workers would be single-status workers. In 1986, 177 of the 190 nonlocal workers would be single-status workers. Even though all workers would live at the railhead site, 13 nonlocal workers (7 percent) were assumed to bring their

families to Cantwell in 1986 to take advantage of the proximity of Cantwell to on-site housing and to make it easier to obtain employment at the Susitna Project dam sites in future years. The percentage of nonlocal railhead workers who would be accompanied by dependents lies between the 3 to 12 percent range found in the surveys of Intertie Project construction workers located in Cantwell (Frank Orth & Associates, Inc., July 1984f; Harza-Ebasco, April 1985). The similarity of the Intertie Project to the railhead in terms of the length of construction period, housing provisions, and union representation in the work force provides the best indicator of the number of railhead workers that would bring dependents with them.

After the origin of the railhead workers and their secondary counterparts was determined, the household size of nonlocal workers that would be accompanied by dependents was determined. This information was obtained from surveys of construction workers (Frank Orth & Associates, 1984f; Harza-Ebasco, April 1985; Mountain West Research, Inc., 1975; and U.S. Army Corps of Engineers, 1981). The family size of accompanied construction workers was assumed to be 3.30 people, with 2 people accounted for as worker and spouse, 1.18 accounted for as school-age children, and 0.12 people accounted for as other dependents such as in-laws and unrelated individuals. The family size assumed for accompanied railhead workers represents the average number of dependents found in the Intertie Project surveys of 1983 and 1984 and the Terror Lake Survey of 1984. (Frank Orth & Associates, Inc., 1984f; Harza-Ebasco, April 1985). This number lies between the 3.11 and 3.51 numbers found in the two surveys of construction workers conducted in the Lower 48 (Mountain West Research, Inc., 1975 and U.S. Corps of Engineers, 1981).

Six of the local workers who would obtain jobs during railhead construction were assumed to obtain railhead operations employment since some of the same skills used during construction will be required during operations. Of the 14 railhead operations jobs, 8 were assumed to be filled by nonlocal residents. All nonlocal operations workers were assumed to be married and have an average family size of 2.93 in accordance with assumptions used for operations workers located at the dam site. In the 2.93 family size, 0.93 school-age children would be included (Frank Orth & Associates, Inc., 1984d).

Ninety percent of the secondary jobs created during construction and operations were assumed to be filled by in-migrants based on the availability of labor in Cantwell during 1983 and 1984. Secondary workers that would in-migrate during construction and operations were expected to have family sizes of 2.84, the household size of more urbanized parts of Alaska. The households of secondary workers were assumed to consist of a worker and spouse and an average of 0.84 school-age children. (Frank Orth & Associates, Inc., 1984d).

Nonlocal construction workers that would remain after construction is completed was assumed to be zero. For nonlocal operations workers, 50 percent were assumed to remain after their jobs are completed. The 50 percent figure falls between the 20 to 60 percent retention rates found in several construction worker surveys (Mountain West Research, Inc., 1975; Frank Orth & Associates, Inc., 1984f). The rate chosen is at the upper end of the range because the longer operations period was expected to increase retention rates above those found for construction workers.

Assumptions about construction, operation, and secondary worker characteristics were applied to with-project employment forecasts. Population impact in Cantwell was then determined by adding all in-migrating workers and dependents for both the direct and secondary railhead-related work force.

After population effects were determined, project-related effects on housing were derived. All unaccompanied employees working directly on the Project were assumed to be housed in single-status quarters near the railhead site by the Power Authority and would not require housing in Cantwell (Alaska Power Authority, 1983). The 13 nonlocal construction workers accompanied by dependents and all in-migrating secondary workers were assumed to require housing in the community. Because the railhead labor force requirements are small and most workers would be housed in single-status housing, it was assumed that no more than one worker per household would obtain a job on the Project. Thus, the number of project-related households is equal to the number of in-migrating workers.

Finally, project-related effects on public facilities and services were determined by applying state and local standards related to use to the project-related population and comparing these to capacities. The following standards were used for each facility or service:

<u>Facility or Service</u>	<u>Standard</u>
Solid Waste	0.0015 acres per person per year
Police Protection	1 officer per thousand population
Education	10.5 pupils per teacher
Average Annual Daily Traffic	4.01 times each person in population
Fire Service	1 volunteer per 27.6 people
Medical Service	1 volunteer per 100 people

The standards were based on per capita or per pupil multipliers which were derived from historical data on local conditions, state standards, or from direct and secondary worker characteristics described above. The standards were the same as those used in the FERC License Application (Alaska Power Authority, 1983). State police standards for rural areas of 1 officer per thousand population were applied to the baseline and with-project populations to determine the impact on police protection in Cantwell.

Traffic volume impacts were determined by multiplying the number of daily trips made per person by the population. The ratio between trips and population for Cantwell of 4.01 was used to produce projections of baseline and with-project conditions (Frank Orth & Associates, Inc., June 1985b). Since baseline households and project-related households have similar travel requirements in that work trips, shopping trips, and leisure trips are made, the baseline ratios were assumed to apply during the with-project scenario (Frank Orth & Associates, Inc., 1984d and 1984f). Truck traffic related to shipment of project materials from the railhead to the Project site was assumed to be 35 round-trips per day on the Denali Highway between 1987 and 1993 based on information contained in the Federal Energy Regulatory Commission License Application and the Traffic Analysis Report (Alaska Power Authority, 1983; and Frank Orth & Associates, Inc., June 1985b).

The effects on fiscal resources were determined in a similar way as effects on public facilities and services. Per capita revenue and expenditure multipliers were determined from historical data (Stevenson, personal communication, 1984). Per capita revenue multipliers were determined to be \$109 dollars per person for state-shared revenues and \$62 per person for federal revenues. Per capita expenditures were assumed to be nearly equal to the per capita revenue multipliers. These baseline ratios were assumed to apply for the with-project alternative. These multipliers were then applied to forecasts of the baseline and with-project population.

After project-related effects for employment, population, housing, public facilities and services, and fiscal conditions were determined, they were compared to baseline socioeconomic conditions in Cantwell. Then, the significance of impacts determined by the comparisons were reported.

### 3.0 DESCRIPTION OF EXISTING RAIL OPERATIONS

#### 3.1 RAIL FACILITIES

Rail facilities, in Cantwell, are currently limited to a section house that provides storage and a place for two Railroad workers to live. In addition, the Cantwell site has sidings and equipment ramps to handle large equipment and freight. The siding is long enough to accommodate 36 cars where one car length is 50 feet. There is also a ramp track (dead-end track) that is eight car lengths long. The sidings are all located within the 200 feet right-of-way of the Alaska Railroad. In all, the Railroad owns about 1,000 acres in scattered parcels surrounding Cantwell (Bivens & Associates, Inc., 1981). About 630 of these acres lie within Native selection areas.

Currently, the Alaska Railroad buys all of its supplies and materials for operations, except fuel, from Anchorage. Fuel is purchased from, and delivered by, Coghill Fuel which is located in Nenana.

Approximately 8-10 freight trains run through Cantwell each week (Coghill, personal communication, 1984). Freight trains are scheduled when shipments have been arranged and trains are loaded to capacity. Starting in late 1984, an additional three trains began running through Cantwell each day dedicated for coal shipments to Korea. These coal trains are expected to run during the proposed railhead construction and operation periods. In addition, passenger trains make seven round-trips per week through Cantwell during the summer (May through October) and one round-trip per week during the winter (November through April).

In Cantwell, 10-15 box cars per year have materials unloaded by Railroad personnel. Most of the freight that is unloaded consists of materials for the Alaska Railroad such as petroleum, oil, and lubricants; the remainder is mining equipment. During construction of the Anchorage-Fairbanks Intertie Transmission Line Project in 1984, the general contractor, Morrison-Knudsen, leased the Cantwell sidings and equipment ramps to ship and unload metal sections used for transmission line towers (Eager, personal communication, 1984).

### 3.2 RAIL EMPLOYMENT

The section house in Cantwell employs a crew consisting of one foreman and one laborer. This section crew is primarily responsible for performing track maintenance. The foreman's hourly wage rate is between \$20 and \$23 dollars. The laborer is paid between \$11 and \$13 dollars per hour (Trueblood, personal communication, 1984). Railroad workers' wages represent the railroad's most substantial contribution to the Cantwell economy.

## 4.0 DESCRIPTION OF THE PROJECT-RELATED RAILHEAD FACILITIES

### 4.1 FACILITIES REQUIREMENTS

The Project's railhead facility would be located approximately one mile south of Cantwell between the Alaska Railroad and the Parks Highway. The facility would be used to unload and store construction equipment shipped to the Watana site via the Alaska Railroad. A 25-acre site will be required. The facility would include fuel storage tanks, a maintenance workshop, unloading dock, modular office, and miscellaneous structures for operating and maintaining transport and construction equipment. About 600,000 cubic yards of dirt would be excavated and 19,700 lineal feet of track would be placed into service to accommodate project materials (R&M Consultants, Inc., 1981). Trucks would be used to transport the unloaded equipment and materials to the Susitna project site from the Cantwell railhead facility via the Denali Highway and project access road (Alaska Power Authority, 1983).

It was estimated by Acres American, Inc. (Chamberlain, personal communication, August 1982) that average project material requirements would fill 46 railcars per week, each carrying a 75-ton load for a total of 3,450 tons per week. Since 8 to 10 freight trains currently pass through Cantwell each week, project material requirements would probably be handled by adding five to six cars to existing trains rather than dedicating new trains to handle these requirements. Shipments would consist of heavy earth-moving equipment, steel, concrete, or some combination of these three items. The Railroad has enough cars and equipment to meet these requirements, except that some special cars (e.g., hopper cars for cement) may need to be acquired during construction of the Devil Canyon dam (Eager, personal communication, 1984). Shipments would occur between March and December each year, from 1987 to 1993.

### 4.2 CONSTRUCTION AND OPERATIONS PERIODS

Construction on railhead facilities would begin in 1985. Construction work would be intense during the summer months of 1985 and decrease by 40

percent during November 1985 to March 1986. During 1985, site preparation, earthwork, and track placement would occur. In 1986, covered storage facilities, unloading docks, and office buildings would be constructed (Chamberlain, personal communication, October 1982). Construction of these facilities would be completed in two years or by the end of 1986. The facility would operate for a period of seven years after construction with shipments starting in 1987 and continuing through 1993 (Alaska Power Authority, 1983). During 1992 and 1993, the facility would be used to transport materials for Devil Canyon construction. After 1993, the Cantwell railhead would no longer be needed for project construction.

#### 4.3 WORK FORCE CHARACTERISTICS

As shown in Table 1, construction of the railhead facilities would require between 128 and 255 workers, averaging 186 workers in 1985 and 223 workers in 1986. Averaged over two years, the construction work force would be composed of 32 (15 percent) administration/engineering personnel, 126 (62 percent) semi-skilled/skilled personnel, and 47 (23 percent) unskilled laborers as illustrated in Table 2. During operations, an estimated 14 workers would be needed to unload equipment and materials, and reload it onto trucks. The operations work force would consist of 3 (21 percent) administration/engineering personnel, 6 (43 percent) semi-skilled/skilled personnel, and 5 (36 percent) unskilled laborers.

Average yearly employment associated with the construction and operations of the railhead is also shown in Table 1. A total of 223 project-related workers would be expected during 1985 and 268 project-related workers in 1986.

#### 4.4 PAYROLL

Estimated payrolls for the construction and operations period are shown in Table 2. During the construction period, it was estimated that annual construction payroll would total 10.5 million dollars. The amount of payroll spent in Cantwell would be much less since a wide range of goods and services cannot be purchased in Cantwell and all unaccompanied non-local workers would live in single-status housing provided by the Alaska

TABLE 1  
RAILHEAD CONSTRUCTION AND OPERATION EMPLOYMENT 1/  
CANTWELL  
1985-1994

YEAR	DIRECT WORK FORCE			SECONDARY WORK FORCE	TOTAL WORK FORCE
	Construction	Operations	Total		
1985	186	0	186	37	223
1986	223	0	223	45	268
1987	0	14	14	3	17
1988	0	14	14	3	17
1989	0	14	14	3	17
1990	0	14	14	3	17
1991	0	14	14	3	17
1992	0	14	14	3	17
1993	0	14	14	3	17
1994 <u>2/</u>	0	0	0	0	0

1/ Numbers in table represent average yearly numbers.

2/ The operations work force of the railhead facility would remain zero for every year after 1993.

Source: Frank Orth & Associates, Inc., March 1984d (secondary work force projections);  
Harza-Ebasco Susitna Joint Venture, correspondence dated March 5, 1985 (direct work force estimates).

TABLE 2

TRADES, WAGE RATES AND PAYROLL OF RAILHEAD WORKERS  
(in constant 1983 dollars)  
CANTWELL  
1985-1994

<u>CONSTRUCTION PERIOD, 1985-1986</u>			
TYPE OF TRADE	AVERAGE WORK FORCE	ANNUAL WAGE RATE	ESTIMATED PAYROLL
Operating Engineers	47	\$55,505	\$ 2,608,735
Teamsters	47	\$58,012	\$ 2,726,564
Mechanics	16	\$58,401	\$ 934,416
Carpenters	16	\$67,982	\$ 1,087,712
Laborers	31	\$49,796	\$ 1,543,676
Catering/Housekeeping	16	\$30,162	\$ 482,592
Technical	16	\$42,457	\$ 679,312
Management/Admin.	16	\$24,860	\$ 397,760
Construction Total	205		\$10,460,767

  

<u>OPERATIONS PERIOD, 1987-1993</u>			
NUMBER OF WORKERS BY TYPE OF TRADE	AVERAGE WORK FORCE	ANNUAL WAGE RATE	ESTIMATED PAYROLL
Operating Engineers	4	\$55,505	\$ 222,020
Teamsters	1	\$58,012	\$ 58,012
Laborers	2	\$49,796	\$ 99,592
Electricians	1	\$64,612	\$ 64,612
Security	1	\$17,434	\$ 17,434
Catering/Housekeeping	2	\$30,162	\$ 60,324
Dispatchers	1	\$20,776	\$ 20,776
Tech. Staff/Admin.	2	\$31,075	\$ 62,150
Operations Total	14		\$ 604,920

Source: Acres American, Inc., October 1982 (occupation data).  
 Alaska Department of Labor, September 1983 (wage rate data in current dollars).  
 Frank Orth & Associates, Inc., 1985 (wage rate data in constant dollars and estimated payroll).

Power Authority. It was assumed that about 16 percent of incomes received by single-status workers would be spent in Cantwell. Local workers and workers accompanied by dependents were assumed to spend about 34 percent of their incomes in Cantwell. These percentages were based on values for secondary employment multipliers which indicate income leakages from the local economy and adjustments for the fact that housing would be provided for all single-status workers (B.H. Tuck, 1980; Frank Orth & Associates, Inc., 1984d). Therefore, about \$2.1 million of the \$10.5 million of total construction income would be spent in Cantwell. During the operations period, the annual payroll for railhead personnel would be about \$605,000, 20 percent of which would be spent in Cantwell. The percent spent was based on secondary employment multipliers (B.H. Tuck, 1980; and Frank Orth & Associates, Inc., 1984d).

#### 4.5 LOCAL CONSTRUCTION AND OPERATIONS PURCHASES

It was assumed that significant amounts of materials and supplies required for construction and operation of the railhead facility would not be purchased locally. The items to be purchased are mostly unavailable in Cantwell. However, items such as gasoline, small hardware, and lumber may be purchased in Cantwell. If they are purchased locally, several businesses would benefit in terms of increased sales and employment. However, these purchases would not generate significant economic effects in Cantwell.

## 5.0 BASELINE SOCIOECONOMIC CONDITIONS

Cantwell is a small unincorporated community in the Yukon-Koyukuk census area, located about ten road miles north of the Mat-Su Borough's northern boundary. It is located at the junction of the Parks and Denali Highways.

### 5.1 EMPLOYMENT

Employment opportunities in Cantwell have typically been limited to a small number of jobs, many of which were seasonal. As the data below indicate, in 1983 and 1984, most businesses in Cantwell had only small numbers of full-time employees and 50 percent of the private sector businesses were family-run businesses (see Section 5.2). Employment in Cantwell was higher during 1983 and 1984 as compared to years past because of the temporary increase in jobs that resulted from the construction of the Anchorage-Fairbanks Intertie Transmission Line Project.

From a survey of Cantwell households (Frank Orth & Associates, Inc., 1984b), it was estimated that approximately 81 adult residents of the community were employed in 1983. In 1984, the number of employed adult residents declined to 76 (Harza-Ebasco, 1985). As shown in Table 3, the total number of jobs in the community was 145 in 1983 and 177 in 1984. During 1983, it was estimated that 57 jobs (39 percent of 145) were held by Cantwell residents and 88 were held by non-residents. Because the Intertie Project employed a large number of non-residents in 1983, the percentage of Cantwell jobs held by non-residents in 1983 would probably not be representative of conditions in future years. The percentage of jobs held by Cantwell residents in 1984 was estimated at 33 percent of the 177 jobs available.

Based on 1983 data, the labor force in Cantwell was estimated to be about 107 people. An estimated 24 percent (26) of the adults in the labor force were unemployed (Frank Orth & Associates, Inc., 1984b). The number of jobs in Cantwell is expected to decline to 111 in 1986 after the Intertie Project is constructed. From 1986 to 2002, an increase of about 4 jobs per year was assumed to occur. This assumption was based on historical growth rates exhibited in public sector jobs between 1978 and 1983

TABLE 3  
EMPLOYMENT BY INDUSTRY  
CANTWELL  
1983 and 1984

INDUSTRIAL SECTOR	WORKERS		WORKERS	
	NUMBER	PERCENT	NUMBER	PERCENT
Construction (Intertie Project)	46	31.7	47	26.6
Retail Trade	20	13.8	33	18.6
Finance, Insurance, and Real Estate	0	0.0	0	0.0
Services	41	28.3	49	27.7
Government	27	18.6	32	18.1
Other <sup>1/</sup>	11	7.6	16	9.0
Total	145	100.0	177	100.0

<sup>1/</sup> Combines other industrial sectors (agriculture, commercial fisheries, & forestry; small construction firms; transportation, communication, and utilities; manufacturing, and wholesale trade) to avoid disclosure of confidential information.

Note: Percentages may not total to 100.0 due to rounding.

Source: Alaska Power Authority, 1984 (government data);  
Frank Orth & Associates, Inc., February 1984a (1983 private sector data);  
Frank Orth & Associates, Inc., July 1984f (1983 Intertie Project data);  
Harza-Ebasco, April 1985 (1984 Intertie Project data);  
Harza-Ebasco, May 1985 (1984 private sector data).

(Alaska Power Authority, 1984). It was necessary to base the assumption on public sector jobs because insufficient historical data were available on growth rates in private sector jobs.

Many of the jobs in Cantwell were highly seasonal in 1983, primarily serving the summer tourist trade. The 26 private-sector businesses in Cantwell (excluding the Intertie Project) accounted for 75 jobs in the summer of 1983, for an average of 2.9 jobs per business. The average level of summer private sector employment in the community was approximately 97 percent higher than the average number of winter jobs (Frank Orth & Associates, 1984a). The public sector agencies in Cantwell accounted for 27 jobs in 1983 for an average of 5.4 jobs per agency (Alaska Power Authority, 1984). In 1984, 17 private sector businesses (excluding the Intertie Project) supplied 98 jobs, for an average of 5.8 jobs per business. <sup>1/</sup> The public sector jobs increased from 11 in 1983 to 16 in 1984.

## 5.2 BUSINESS ACTIVITY

Cantwell had a small private sector economy as discussed in Section 5.1. According to interviews with Cantwell business owners in 1983, about 41 percent of the businesses in Cantwell were retail operations; another 25 percent were service establishments, including four lodges and inns. These businesses were small, with 80 percent of the establishments having two or less full-time employees. Almost half of the businesses had no full-time employees (Frank Orth & Associates, Inc., 1984a). During 1984, the percentage of establishments that were included in the retail trade and services sectors fell to 45 percent of the total. Construction businesses increased from 2 in 1983 to 6 in 1984 (Harza-Ebasco, May 1985). The number of government agencies was five for both years.

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<sup>1/</sup> The number of businesses found in the 1983 survey were greater than in the 1984 survey because of a change in research methods. The change resulted in the 1984 survey combining businesses when they were owned by the same person and shared the same building. In the 1983 survey, the single business was treated as two or more businesses because it provided multiple distinct products and services.

The number of business establishments was assumed to remain fairly steady between 1985 and 2002. New employment opportunities were assumed to occur from expansion of existing businesses, not from new enterprises.

### 5.3 DEMOGRAPHIC CHARACTERISTICS

In 1981 and 1982, there were 183 people living in Cantwell. In 1983 and 1984, population was estimated at 193 which excludes the effect of the Intertie Project (Frank Orth & Associates, Inc., 1984a; Harza-Ebasco, 1985). Cantwell was a staging site (a place where workers live and report for job assignments) for the Intertie Project in 1983. However, most Intertie Project workers were not included in the 1983 and 1984 population estimates because they were housed in lodges which were not covered in the sampling frame of the household surveys. From the construction worker survey, the Intertie Project workers and their dependents accounted for about 55 people during June to October of 1983 (Frank Orth & Associates, Inc., 1984f). In the absence of railhead construction, the community was assumed to grow in population by approximately two percent per year, reaching 240 people by 1994. (Frank Orth & Associates, Inc., 1984d).

The average age of Cantwell residents was approximately 36 years in 1983 (Frank Orth & Associates, Inc., 1984a). About 18 percent of the adult residents surveyed in 1983 were members of a Native organization. According to the 1984 household survey, average age in the community fell to 31.5 years and 19 percent of the adults were members of a Native organization (Harza-Ebasco, 1985).

The number of households in Cantwell grew from 69 in 1982 to 81 in 1983, representing an increase of over 17 percent. The number of households dropped to 68 in 1984 but are expected to grow at the rate of 1.2 percent per year over the next 20 years (Frank Orth & Associates, Inc., 1984a; Harza-Ebasco, 1985).

#### 5.4 HOUSING AND LAND AVAILABILITY

In 1982, there were 96 housing units in Cantwell, of which 69 were occupied (Community of Cantwell, Inc. 1982), indicating a 28 percent vacancy rate. In October 1983, an estimated 126 housing units existed in Cantwell. The vacancy rate was determined to be 36 percent. The number of housing units fell to 101 in 1984 and vacancy rates also declined to 33 percent (Harza-Ebasco, 1985). Some of the vacant units in Cantwell do not have dependable sources of water or electricity, and thus could be termed marginal as year-round housing. The total number of housing units is expected to grow at a rate of 1.6 percent per year, reaching a total of 118 housing units in 1994 (Frank Orth & Associates, Inc., 1984d).

Between 1980 and 1984, settlement in Cantwell has been limited by the availability of land for development. Non-native private land was scarce in and around Cantwell and the plots that were available were relatively expensive (Lindahl, personal communication, 1984). In 1984, there were 240 acres of private land in Cantwell with clear title (Frank Orth & Associates, Inc., 1985a). Average lot sizes in Cantwell's townsite were about one-half acre in size. In the Draschner subdivision, lot sizes were 1 acre (Moberg, Miller, Gilbertson, personal communications, 1984).

#### 5.5 PUBLIC FACILITIES AND SERVICES

There is one school in Cantwell, serving students in kindergarten through 12th grade. It is part of the Railbelt School District. The school has capacity for approximately 60 students and, in 1983, there were 32 students enrolled. The school employed three full-time teachers, two part-time aides, a part-time librarian and a part-time secretary. In 1984, enrollment expanded by 10 students and one full-time teacher was added (Moberg, personal communication, 1984; Paul, personal communication, 1984). Baseline enrollment is expected to fall to 37 students during 1985 and 1986 after construction of the Intertie Project is completed. Between 1986 and 1994, enrollment would grow by 1.9 percent per year, or at about the same rate as population.

Police protection is provided by one Alaska State Trooper stationed at Cantwell. Another enforcement agent responsible solely for fish and

wildlife protection and enforcement is also stationed in Cantwell (Ellis, personal communication, 1984). The baseline number of police officers would not increase between 1984 and 1994.

Cantwell recently formed a fire service area and constructed a fire hall. Firefighting equipment included a 1000 gallon pumper, a four-wheel drive vehicle, and a two-ton General Motors Corporation pick-up. Seven people served as volunteer firefighters (Moberg, personal communication, 1984). Two additional volunteers would be required to serve the baseline population of 240 people in 1994, if the current ratio of one volunteer to 27.6 people is to be maintained.

Medical care available in the community consists of an ambulance and several emergency medical technicians (EMTs). The nearest additional medical services are available from a doctor's assistant in Healy; most residents go to Anchorage or Fairbanks for specialized medical care (Alaska Power Authority, 1983). Medical care services would not change in response to baseline increases in population.

Cantwell is located at the junction of the Parks and Denali Highways and alongside the Alaska Railroad. Many of the homes in the community are located along the Denali Highway, extending from two miles west of the Parks and Denali Highways' junction to two miles east of the junction. The Alaska Department of Transportation and Public Facilities (ADOTPF) is responsible for maintenance of these two roads. In the winter, snow is not plowed on the Denali Highway east of Cantwell, and it is therefore closed to traffic. Because Cantwell is not part of an incorporated borough, the small number of local roads are largely unmaintained (Alaska Power Authority, 1983).

Baseline average annual daily traffic volumes on the Parks Highway between Cantwell and Healy would increase from 791 in 1984 to 963 by 1994, representing an increase of about 2 percent per year. Current traffic volume capacity on this road segment is 7,900 vehicles per day. Baseline capacity utilization would increase from 10 percent in 1984 to slightly more than 12 percent in 1994 (Frank Orth & Associates, Inc., 1985b).

A small airstrip is also located in Cantwell. It is designed for light propeller aircraft. No changes in facility characteristics were assumed to occur under baseline conditions (Alaska Power Authority, 1983).

There are no water or sewage systems in Cantwell. Residents rely on individual wells and septic tanks. Residents of Cantwell have been using a landfill site for solid waste disposal that is not maintained by any public authority and that is on privately owned land. The Community of Cantwell, Inc. is attempting to purchase the 2-acre landfill site to allow dumping to take place at the site under monitored conditions (Moberg, personal communication, 1984).

Local standards of waste generation at 0.00015 acres per person were assumed to continue between 1984 and 1994 (Frank Orth & Associates, Inc., 1984d). The number of acres at the site that were used in 1984 was 0.08 acres. By 1994, the number of acres in use would rise to 0.42 acres. Capacity utilization would rise from 4 percent in 1984 to 21 percent in 1994.

## 5.6 FISCAL RESOURCES

In 1980, residents formed a non-profit corporation called Community of Cantwell, Inc. It was set up as an entity suitable for receipt of state grants. To date, about \$627,000 dollars have been received from the Alaska Department of Community and Regional Affairs (ADCRA), state revenue-sharing funds, and federal revenue-sharing funds. Over 87 percent of all funds received to date has come from the ADCRA. (Stevenson, personal communication, 1984). The monies received from these various sources have been used to purchase a fire truck, emergency medical and fire station equipment, and library books, and to construct a helicopter pad for emergency evacuation (Moberg, personal communication, 1984). Some of these monies have been set-aside to purchase the land fill site. The school in Cantwell is operated with state funds through the Railbelt School District.

Cantwell received annual state-shared revenues in the amount of \$21,037 in FY84 which is similar to funds received in FY82 and FY83 (Stevenson,

personal communication, 1984)). These monies were used to fund the operations of the volunteer fire department, ambulance service, the community center, the library, the heliport, and the land fill site. Federal revenue-sharing funds in the amount of \$12,000 were also received in FY84.

Baseline federal and state revenue-sharing funds would increase by 2 percent per year between 1984 and 1994. Baseline revenues would grow from about \$33,000 in 1984 to \$41,000 in 1994.

## 6.0 PROJECTED SOCIOECONOMIC EFFECTS OF THE RAILHEAD FACILITIES

This section discusses the projected socioeconomic effects of the railhead facilities in relationship to the baseline forecasts of employment, population, households, demand for public facilities and services, and fiscal resources.

### 6.1 EMPLOYMENT

As shown in Table 4, the 268 project-related jobs created by the railhead would represent an increase of 241.4 percent over the baseline number of jobs in 1986. There would be a total of 379 jobs in the community in 1986. In 1990, the additional 17 jobs created by railhead operations would increase the total number of jobs in the community to 144 or an increase of about 14 percent over baseline conditions.

### 6.2 BUSINESS ACTIVITY

It is not anticipated that the railhead facility would significantly affect the way that existing businesses conduct their activity in Cantwell. The retail and service industries would be the primary beneficiaries of increases in secondary sales and employment. However, due to the small size of all the businesses in the community, more train cars and more frequent train schedules for hauling project-related materials would not cause existing Cantwell businesses to increase their use of rail transportation to obtain supplies or to ship products. According to Railroad officials, small businesses would find it more economical to use truck transportation than rail transportation (Coghill, personal communication, 1984).

The railhead facility in Cantwell would not affect the location decisions of retail and service industries because their small size would not allow them to take advantage of the facility. However, it could affect the locational decisions of large resource-extractive industries. At present, the resource-extractive industries in the local area are small-scale, independent mining companies operating in areas surrounding Cantwell. Most of these companies are conducting seasonal exploratory activities

TABLE 4  
 BASELINE AND RAILHEAD FACILITY EFFECTS  
 ON SELECTED ECONOMIC AND DEMOGRAPHIC CONDITIONS  
 CANTWELL  
 1984, 1986, 1990, and 1994

Socioeconomic Variable	Year			
	1984	1986	1990	1994
<b>Employment (Jobs) <u>1/</u></b>				
Baseline	149	111	127	143
With-Project	149	379	144	143
Impact of Project	0	268	17	0
Railhead-Related Increase (%) <u>2/</u>	0.0	241.4	13.4	0.0
<b>Population</b>				
Baseline	197	205	222	240
With-Project	197	541	254	252
Impact of Project	0	336	32	12
Railhead-Related Increase (%) <u>2/</u>	0.0	163.9	14.4	5.0
<b>Households (Occupied Units)</b>				
Baseline	82	84	88	92
With-Project <u>3/</u>	82	138	99	96
Impact of Project	0	54	11	4
Railhead-Related Increase (%) <u>2/</u>	0.0	64.3	12.5	4.3

1/ Employment by place of work.

2/ Calculated by dividing the impact number by the baseline number.

3/ Assumes that 33 of the 223 railhead workers would be previously existing residents, that 13 of the 190 non-resident railhead workers would be married and accompanied by families, thus requiring private housing, that the 41 nonlocal support workers and their families would require private housing, and that the 177 single-status railhead workers would be provided housing by the Alaska Power Authority.

Source: Frank Orth & Associates, Inc., 1984e.

only. Because they are not in commercial operation, they cannot take advantage of the railhead facilities that would exist. However, the location of the railhead facilities could enhance commercial feasibility of ore deposits when they are identified (Moberg, personal communication, 1983).

### 6.3 DEMOGRAPHIC CHARACTERISTICS

In 1986, the total railhead-related population influx is projected to be 336 people. As shown in Table 4, railhead-related population would represent about 164 percent of the baseline population forecast (205) in 1986. In 1990, the total railhead-related population would number 32 people, representing about a 15 percent increase over baseline population of 222. The 12 railhead-related people residing in Cantwell in 1994 would account for an increase of 5 percent over baseline population projections of 240 people.

### 6.4 HOUSING AND LAND AVAILABILITY

In 1986, railhead-related impact on housing demand during construction would be 54 households (13 accompanied non-local direct workers plus 41 accompanied nonlocal support workers). The 177 single-status, nonlocal railhead workers would be accommodated in single-status housing provided by the Alaska Power Authority at the railhead site. Total baseline and railhead-related households in 1986 would equal 138 (excluding single-status, nonlocal railhead workers) or about a 65 percent increase over baseline conditions.

The railhead-related increase of 54 households in 1986 would create a housing shortage in Cantwell. There would be a total of 21 vacant housing units in Cantwell after baseline housing demand of 84 households were accommodated. Therefore, a housing shortage of 33 units would exist in 1986. During operations, there would be sufficient housing to accommodate all railhead-related households. In 1990, 11 railhead-related households would be accommodated in the 24 vacant housing units that would be available after baseline demand for housing is met. As shown in Table 4, the 11 households would represent an increase of about 13 percent over projected baseline households of 88 in 1990. After operations

have ceased, railhead-related households would decrease to four. In 1994, total baseline and railhead-railhead households would number 96 or over 4 percent higher than baseline households in that year.

Railhead-related increases in households during construction would be adequately accommodated on the estimated 240 acres of private land in Cantwell. The type of housing units to be built would primarily consist of single-family dwellings, either houses or mobile homes. Since a substantial number of these units would not be needed during the operations period, many of the in-migrating construction worker-related households could be accommodated by using mobile homes.

## 6.5 PUBLIC FACILITIES AND SERVICES

The railhead construction would add 49 students to baseline enrollment levels in 1986. As shown in Table 5, this increase represents about a 133 percent increase over the baseline enrollment of 37 in 1990. The capacity of the existing school would be insufficient to meet the railhead-related increase in enrollment. During 1986, capacity utilization would run at about 144 percent. Several mobile units would be required to adequately handle the project-related impact.

About 10 students would be added to baseline enrollments during the operations period of the railhead facility, representing an increase in students of 25 percent over baseline in 1990. The school would contain 10 students less than the design capacity of 60 in this year. Capacity utilization would run at 83 percent.

An additional 5 teachers would be hired during the construction period if current pupil/teacher ratios of 10.5 are to be maintained. However, considering the short term nature of the construction impact, it is likely that other options (such as double shifting or increasing pupil/teacher ratios) would be used to handle the temporary increase in enrollment. During operations, an additional teacher would be necessary to maintain the historical standard.

According to projected increases in population during the construction and operations period, additional troopers would not need to be hired to

TABLE 5

BASELINE AND RAILHEAD FACILITY EFFECTS  
ON SELECTED PUBLIC FACILITIES AND SERVICES  
CANTWELL  
1984, 1986, 1990, AND 1994

Socioeconomic Variable	Year			
	1984	1986	1990	1994
<b>School Children</b>				
Baseline	42	37	40	43
With-Project	42	86	50	47
Impact of Project	0	49	10	4
Capacity <u>1/</u>	60	60	60	60
Railhead-Related Increase (%) <u>2/</u>	0.0	132.4	25.0	9.3
Capacity Utilization (%) <u>3/</u>	58.3	143.3	83.3	78.3
<b>Police Protection (Troopers per thousand population)</b>				
Baseline	.20	.21	.22	.24
With-Project	.20	.54	.25	.25
Impact of Project	.00	.33	.03	.01
Capacity <u>1/</u>	1.00	1.00	1.00	1.00
Railhead-Related Increase (%) <u>2/</u>	0.0	157.1	13.6	4.2
Capacity Utilization (%) <u>3/</u>	20.0	54.0	25.0	25.0
<b>Traffic (Average Daily Traffic) On Parks Hwy. Between Mileposts 175.85 and 203.17</b>				
Baseline	791	823	891	963
With-Project	791	1,586	1,019	1,111
Impact of Project	0	763	128	48
Capacity <u>1/</u>	7,900	7,900	7,900	7,900
Railhead-Related Increase (%) <u>2/</u>	0.0	92.7	14.4	5.0
Capacity Utilization (%) <u>3/</u>	10.0	20.1	12.9	14.1

1/ Includes existing and planned capacity, December 1983.

2/ Calculated by dividing the impact number by the baseline number.

3/ Calculated by dividing the with-project number by the capacity number.

Source: Frank Orth & Associates, Inc., March 1984c.  
Frank Orth & Associates, Inc., March 1984e.

maintain the regional standard of one trooper per 1,000 population in unincorporated rural areas. During 1986, capacity utilization would reach a peak of 54 percent before declining to 25 percent in 1994.

The railhead facility would not significantly affect fire protection in Cantwell. The existing fire hall and equipment should be sufficient to serve the community as it grows. Thirteen more volunteers would be needed to serve on the volunteer fire department in 1986 to maintain the ratio of 1 volunteer for each 27.6 people (Moberg, personal communication, 1984). One additional volunteer would be required for the with-project population during operations. Application of the standard assumes that no fire protection will be provided by the Power Authority for single-status housing. If the Power Authority provides some form of fire protection on-site, then only six volunteers will actually be needed to meet the needs of the railhead-related population housed in the community.

Because the railhead construction period is short, the quantity and quality of medical services would not change substantially. Hours at the Healy medical clinic may expand to handle increases in Cantwell patients. At a minimum, between 3 and 4 more Emergency Medical Technicians (EMTs) would be required to attend to the increased population during railhead construction if the standard of 1 EMT to 100 people is to be maintained.

Railhead construction would not affect traffic volumes along the Denali Highway as most workers would travel along the Parks Highway for extended shopping and recreation trips. As shown in Table 5, railhead-related traffic would increase baseline average annual daily traffic volumes (AADT) between mileposts 175.85 and 203.17 on the Parks Highway. In 1986, railhead-related AADT would be 1,349 or about 164 percent over the baseline AADT of 823. In 1990, railhead-related AADT would represent about a 15 percent increase over baseline AADT of 891.

Improvements in road capacities of the Parks Highway would not be necessary as the road was originally constructed with large amounts of excess capacity which was only about 10 percent utilized in 1983 (Alaska Power Authority, 1983). During railhead construction, road capacity utilization would increase to about 28 percent in 1986 before falling to 13

percent in 1990. About 65 percent of the road resurfacing expenditures identified in the Traffic Analysis Report would be related to railhead activities because 65 percent of the total Susitna Project effect in that year would be related to the railhead (Frank Orth & Associates, Inc., 1985b). Therefore, the railhead effect on road resurfacing expenditures would be about \$1,235 per lane mile per year on this 27.32 mile-long road segment.

Water and sewer systems would not be developed to meet railhead-related increases in population as the costs for serving such a small population would be prohibitive. Residents would still rely on individual wells and septic tanks.

Railhead-related increases in population would shorten the life of the dump site by increasing the baseline capacity utilization of the site from 21 percent to 28 percent in 1994. However, more effective monitoring procedures and the removal of some recyclable garbage to Nenana is expected to extend the life of the dump by several years and offset the effects of railhead-related increases in population (Moberg, personal communication, 1984).

## 6.6 FISCAL RESOURCES

Railhead-related increases in population would not significantly add to the revenues received by the community since 87 percent of the revenues have come in the form of grants. However, state and federal revenue-sharing funds (which make up the other 13 percent) would increase in response to increases in population. Currently, it is estimated that Cantwell receives about \$109 per person in state-shared revenues and about \$62 per person in federal-shared revenues each year. If these ratios are applied to railhead-related population forecasts for Cantwell, then revenues would be expected to increase by \$57,456 in 1986 and \$5,472 in 1990 over baseline revenues of \$35,055 and \$37,962, respectively. These increased revenues could be used to maintain the dump site, purchase fire-related equipment, and improve medical services within the community. State monies would be used to fund any education-related impacts from the railhead since the Cantwell school is operated by the state-funded Railbelt School District.

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