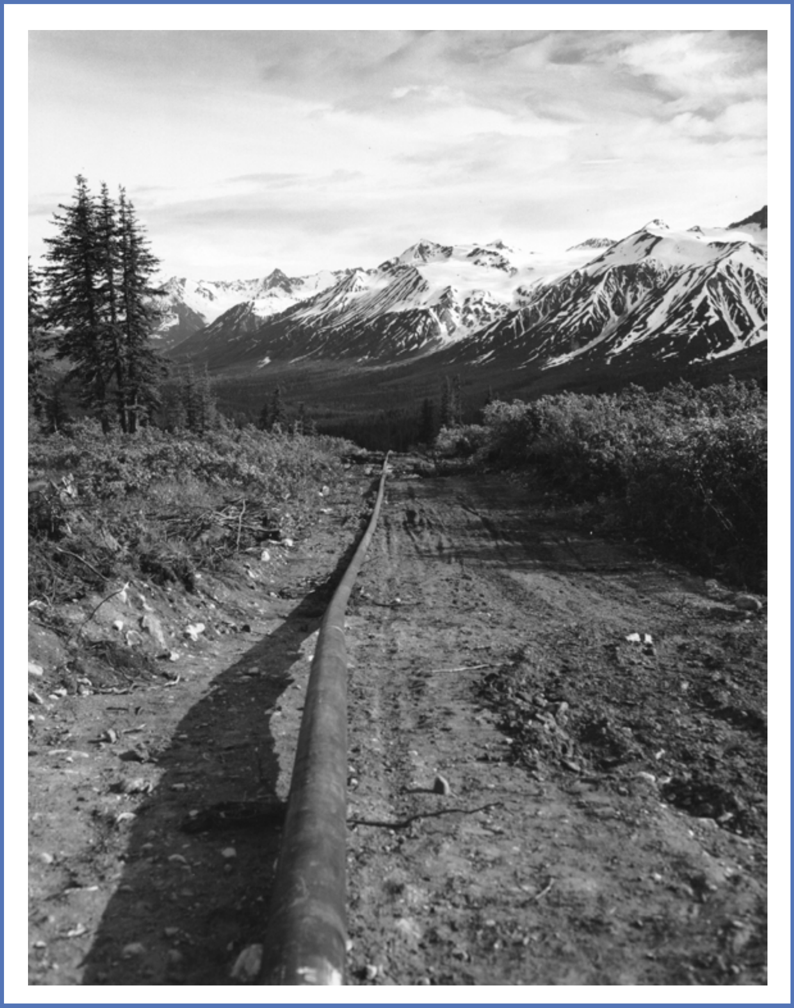
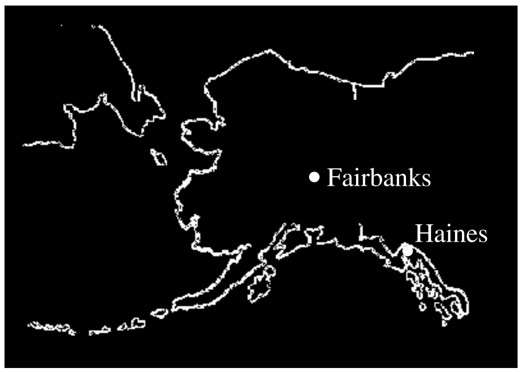
The Haines-Fairbanks Pipeline



April 2003

CEMML TPS 03-04

The Haines-Fairbanks Pipeline



Kristy Hollinger

Edited by:

Glenda R. Lesondak

Prepared by:

Center for Environmental Management of Military Lands
Colorado State University
Ft. Collins, CO 80523-1490

Russell H. Sackett
Conservation Branch
Directorate of Public Works
U.S. Army Alaska
Fort Richardson, AK 99505-6500

April 2003

CEMML TPS 03-04

TABLE OF CONTENTS

LIST OF FIGURES

Cover: Pipeline from top of Summit out of Camp 2. Chilkoot Pass. July 20, 1955.

All photographs published from the National Archives & Records Administration: Pacific Alaska Region are from the same collection: Record Group No. 77 (Army Corps of Engineers) Installation Historical Files, 1938-1973, Boxes 8, 9 and 11. Hereafter the source of these photos will be referred to as NARA.

LIST OF MAPS

LIST OF TABLES

CHAPTER 1.0 Introduction

When people think of pipelines in Alaska the first thing that usually comes to mind is the Trans-Alaska Pipeline. But the state has actually been host to several large pipeline systems over the past 60 years. The Haines-Fairbanks Pipeline was a lesser-known Cold War era project owned and operated by the U.S. Army from 1955 to 1973. The eight-inch diameter pipeline transported refined fuel from a deep-water port at Haines to Fort Greely, Eielson Air Force Base, and Ladd Air Force Base (Ladd AFB was transferred to the Army and became Fort Wainwright in 1961).

The U.S. Army Corps of Engineers was responsible for pipeline design and construction. The Corps contracted most of this work to private companies, maintaining a supervisory role over the project. The pipeline was designed from 1950 to 1952 and construction occurred over 22 months, from 1953 to 1955. Civilian, federal wage-grade personnel operated the pipeline in conjunction with orders received via teletype from the Petroleum Division headquarters at Fort Richardson.[1]

Four types of fuel were conveyed over the 626-mile route including diesel, automotive gas, jet fuel and aviation gas. The vast majority of fuel transported was JP4: jet fuel. Originally, five strategically located pump stations pressured fuel through the pipeline. In 1961, six booster stations were added to the system to increase the fuel output. When operating at maximum capacity, the pipeline could deliver 27,500 barrels of fuel a day, most of which was for Air Force use.

Fuel was an essential commodity that powered Cold War missions of defense and deterrence. The Haines-Fairbanks Pipeline was considered a logistical asset and the most reliable, efficient means of transporting the vast quantities of fuel needed in interior Alaska. In 1970 investigations revealed the pipeline metal was deteriorating, particularly on the southern half of the system. Repair costs were prohibitive, and plans to shut the Haines to Tok section of the line were implemented. The Tok to Fairbanks section continued operating until 1973 when it too was closed. Routine operations, normal for the period, resulted in environmental contamination, particularly at the main pipeline pump stations in Haines, Tok and Fairbanks. Environmental investigations and restoration work have been ongoing at these sites since the early 1990s.

The purpose of this report is to document the history of the pipeline from its inception to the conclusion of operations. The document was written to fulfill the requirements of a Memorandum of Agreement (MOA) between the U.S. Army Alaska and the State Historic Preservation Officer (SHPO). The report was written in consultation with the Fort Wainwright Cultural Resources Working Group, the U.S. Army Corps of Engineers and the Alaska State Historic Preservation Office (SHPO). The MOA sets stipulations for the demolition and cleanup of the Tok Terminal. Stipulation 3C required historic documentation of the pipeline.

[1] The Army's petroleum operations underwent several name and organizational changes over the years that the Haines-Fairbanks Pipeline operated. Petroleum Division was the last designation used.

As a significant Cold War property, preservation of the pipeline's history is important and a requirement under federal regulations, as stipulated in Section 110 of the National Historic Preservation Act of 1966 (as amended).

1.1 Acknowledgments

Many former employees and their family members generously shared memories of the Haines-Fairbanks Pipeline for this study. Special thanks to: Randy Acord, Layton Bennett, Johnny Burnham, Ray Carder, Vern McConnell, Richard Duke, June Haas, Dwight Hanson, Earnest and Laura Kelly, Edward and Elizabeth Karmen, John Koehler, George Lyle, Genie Menaker, David Menaker, Clarence Sparks, Joyce Thomas and Thomas Webster. Without them, this project would not have been possible.

Also, thanks to the following for assisting in various stages of the project: Fort Wainwright Cultural Resources Working Group; Lee Clayton, President of the Chilkat Indian Association; Sarah Epps, Cold Regions Research and Engineering Laboratory; Diane Hanson, U.S. Army Corps of Engineers; Kathy Price, USARAK Cultural Resources Specialist; and Russ Sackett, USARAK Cultural Resources Manager.

1.2 Methods

This project was initiated with background research in files at the U.S. Army Alaska's, Department of Public Works, Environmental, Fort Richardson. Three studies served as basic reference sources on the pipeline facilities and operations:

> Garfield, D.E., Ashline, C.E., Haines, F.D. and Ueda, H.T. *Haines-Fairbanks Pipeline: Design, Construction and Operation.* SR 77-4 CRREL. February 1977.
>
> Pamphlet 360-1, *Description of Alaskan Military Petroleum Facilities.* 172 Infantry Brigade (Alaska) 15 January 1982.
>
> Rickard, W.E. and Deneke, F. *Preliminary Investigations of Petroleum Spillage, Haines-Fairbanks Military Pipeline, Alaska.* April 1972.

Haines-Fairbanks Pipeline: Design, Construction and Operation provided a historical narrative of the pipeline. *Description of Alaskan Military Petroleum Facilities* described facilities and equipment at each pump station. And *Preliminary Investigations of Petroleum Spillage* discussed the effects of documented oil spills along the pipeline corridor before 1972.

Background research was also conducted at the Loussac Library and the Alaska Resources Library & Information Services (ARLIS). There were only brief references to the pipeline in historical literature. ARLIS provided magazine articles recording the pipeline's construction. These articles were valuable in reconstructing the early pipeline history. Also important to documenting construction was a special "Pipeline Edition" of the *Anchorage Daily News* published October 11, 1955.

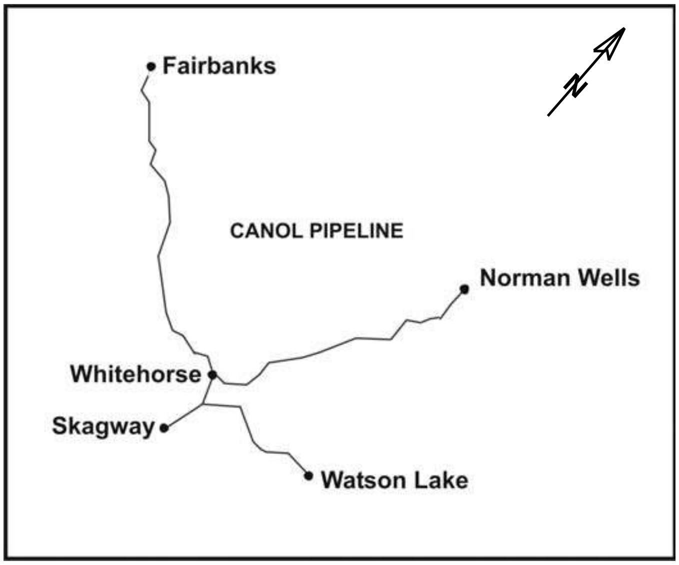
Initial archival research was conducted at the University of Alaska Anchorage (UAA) Archives and Manuscripts Department, the National Archives and Records Administration, Alaska Pacific Region, the University of Alaska Fairbanks Archives (UAF), the Alaska State Archives, Yukon Archives, and the Sheldon Museum and Cultural Center Archives.

Primary sources documenting the pipeline's history were difficult to find. Original records may have been disposed or transferred out of state when the pipeline was shut down. Alaskan archival resources produced limited information.

Oral history interviews were a key information source for this study. Former Haines-Fairbanks Pipeline employees and their family members filled gaps in the written sources and added a personal dimension to the pipeline story. Fifteen people were interviewed in Haines, Haines-Junction, Tok, Fairbanks, and Anchorage. One interview was conducted over the phone. Two interviews conducted for the Sheldon Museum oral history program also proved useful.

The author contacted the companies that built and designed the pipeline. Neither Willbros, now known as Willbros USA Inc, nor Fluor Corporation had original documentation regarding the pipeline's history in their archives.

Chapter 2.0 Context



Map 1. CANOL Pipeline. Based on map in *Invention & Technology*, "Pipe Dream" by Raoul Drapeau.

As the defense infrastructure expanded in Alaska during World War II, fuel supplies became a growing concern, particularly at Interior bases. The Lend-Lease program and Alaska-Canada Highway (ALCAN) construction required steady fuel supplies.[2] The Alaska Railroad transported fuel to the Interior and coastal points were supplied by oil tankers. However, the railroad was plagued with scheduling difficulties and burdened with shipping war supplies. It was also unreliable and slow to move the amount of fuel required. Oil tankers were in short supply due to the war effort and were vulnerable to attack.[3]

These fuel supply issues received attention at the highest levels of government, and construction of a pipeline was quickly authorized. The CANOL Pipeline (Canadian American Gas Oil pipeline) would move crude oil from Canadian oil fields at Norman Wells to a refinery at Whitehorse. From Whitehorse, supplementary lines would deliver refined fuel to Fairbanks, Skagway and Watson Lake. The combined length of the pipelines was 1,600 miles. The project's appeal lay in the protected inland fuel source that would allow the Army to decrease its dependence on Navy tankers.[4]

CANOL construction was a massive effort in terms of money and labor consumed. The project was authorized quickly without feasibility studies or a full understanding of the conditions and costs that would be encountered.[5] The final price tag for construction was about $130,000,000.00. At the peak of construction, over 10,600 civilians and 4,000 engineer troops worked on the project.[6] The work started in 1943 and the pipeline was operating by April of 1944. The CANOL ran at full capacity for only 12 months before sections were shut down in April, 1945. The system was plagued with leaks and spills during its short service and maintenance costs were prohibitive. Major development of the Norman Wells oil fields ceased in 1945. The Whitehorse refinery was sold and dismantled in 1947. The pipeline from Skagway to Fairbanks continued to be used in a limited capacity until 1958, delivering fuel to Whitehorse, Fairbanks and other points along the Alaska Highway. Skagway was receiving fuel by oil tankers.[7]

---

[2] The Lend-Lease program ferried U.S. equipment to the Soviet Union during W.W.II.

[3] Drapeau, Raoul. "Pipe Dream." *Invention & Technology* (Winter) 2002.

[4] Woodman, Lyman L. *Duty Station Northwest: The U.S. Army in Alaska and Western Canada, 1867-1987,* Volume Two 1918-1945. Anchorage: Alaska Historical Society, 1997.

[5] Fradkin, Philip. "The First and Forgotten Pipeline." Source unknown.

[6] Ibid.

[7] Menders, Paul. *First Draft Report: An Evaluation of the Economics of Utilizing the Haines-Fairbanks Pipeline for Civilian Purposes.* Economic Staff Group, Northern Development Branch, D.I.A.N.D. 29 April 1970.

Alaska's proximity to the Soviet Union propelled the territory's development to a strategic Cold War theater beginning in 1947. The U.S. Army Corps of Engineers embarked on large-scale construction efforts across the territory to bolster the defense infrastructure. Fuel supply again became a key logistical issue for the military's widely scattered bases. As stated in an annual report, "Logistic operations in the Alaskan Command (were) unique, not because of the forces or missions assigned, but because of complexities created by vast distances, limited surface transportation, difficult terrain, and the extreme variations of weather encountered within the territory."[8]

The CANOL was in poor condition and too small to meet the military's anticipated fuel demand. The Army needed a system that would reliably and quickly get fuel to Ladd Air Force Base, Eielson Air Force Base and Fort Greely. The bases played a key role in the Cold War as Alaska served as "a giant listening post" and the first line of defense against Soviet attack. Cold region training and research, aerial reconnaissance, and aerial defense were crucial Army and Air Force missions occurring at Interior bases. [9]

As during World War II, a pipeline was once again identified as the best fuel transportation solution. It was thought to be cheaper than using the railroad, which was shipping the most fuel at the time. Railroad delivery cost ten cents a gallon, while it was estimated that pipeline delivery would cost two cents a gallon.[10] Also, fuel delivery had to compete with other railroad shipping demands. The pipeline would be devoted solely to petroleum transportation. Finally, Cold War strategy called for a reliable and safe delivery route. A pipeline was a smaller, less vulnerable target than the highly visible railroad.[11] This was an important consideration during the tense Cold War years.

[8] "History of the Alaskan Command, 1969." Prepared by the Historian, Office of the Secretary, Joint Staff Headquarters ALCOM.
[9] Price, Kathy. Northern Defenders: *Cold War Context of Ladd Air Force Base Fairbanks, Alaska 1947-1961*. CEMML TPS 01-2 January 2001.
[10] "History of the Alaskan Command. 1 July 1956." Prepared by Office of Information Services, Alaskan Commnd.
[11] Haas, Frank M. "The Haines / Fairbanks Pipeline." February 1992. On file at Sheldon Museum & Cultural Center, Haines, AK.

Chapter 3.0 Project Planning, 1947–1953

Though most defense fuel was consumed by the Air Force, petroleum distribution (along with supply logistics) was an Army function. An Army pipeline to replace the CANOL was considered as early as 1945.[12] After congressional authorization, the design phase was implemented in 1950, just as the Korean War started. The Haines-Fairbanks Pipeline was also known as the Alaska Canada Gas Oil Pipeline or ALCANGO.

3.1 Design Contract

The U.S. Army Corps of Engineers was in charge of the pipeline construction. In 1950, the Corps issued invitations to bid on the project's design. Fluor Corporation, of Los Angeles, California, won the bid. It designed the line from 1950 to 1952. Fluor subcontracted some of the research work to Ryall Engineering, a Little Rock, Arkansas company.

Issues of cold climate construction necessitated careful planning and design. Preliminary route studies were conducted by air, automobile and foot.[13] Ryall Engineering explored the pipeline corridor and researched the CANOL operating records. Engineers hoped to learn from past mistakes and avoid the problems experienced with the CANOL.[14]

3.2 Pipeline Route

The first step in designing the pipeline was choosing the route. Haines to Fairbanks was a logical choice because of the proximity to existing infrastructure. Haines was located on a deep-water, ice-free inlet with year-round access. The inlet was large enough to handle the heavy tanker traffic pipeline fuel deliveries would generate. There was already a dry cargo dock present, which could accommodate massive supply deliveries and allow construction to begin immediately. And Haines was a strategic location that let tankers use a protected coastal route on the journey to Alaska, avoiding the rough, open seas of the Gulf of Alaska. From Haines the pipeline could follow the Haines Highway and the ALCAN Highway north to Fairbanks. Roads were essential for transporting equipment during construction, and later for maintenance access. Eliminating the need to build both a road and a pipeline corridor was another way to speed construction.

The Haines-Fairbanks route traversed two countries and a diverse landscape of variable climates. Recorded temperatures ranged from a low of -82∀F in Snag, Yukon Territory to a high of 92∀F in Fairbanks, Alaska.[15] The line snaked through mountain, tundra, swamp and plateau. Designers had to carefully consider extreme elevation changes, which affected the location and number of pump stations needed.

---

[12] Pamphlet 360-5. *The U.S. Army in Alaska*. 172nd Infantry Brigade (Alaska) May 1976. p.104.

[13] George, W. "The Alaska Pipe Line." *The Military Engineer*. Nov-Dec 1955. p.460.

[14] "The Alcango Pipeline: Part 1 of 2." *Western Construction*. Feb. 1955. p.37, 38.

[15] Garfield, D.E., Ashline, C.E., Haynes, F.D., & Ueda, H.T. *Haines-Fairbanks Pipeline: Design, Construction and Operation*. CRREL, Special Report 77-4. February 1977. p.1.

Table 1: Pipeline crossings.

HAINES-FAIRBANKS PIPELINE	
Major River Crossings	25
Minor Stream Crossings	82
Major Highway Crossings	49
Secondary Road Crossings	39
Major Swamp Tundra Crossings	11

They also tried to keep the pipeline as straight as possible to shorten the route and avoid excessive use of pipe.[16]

The 50-foot-wide pipeline right-of-way was located after aerial and ground investigations. To narrow down the final corridor selection, aerial surveys and photography were used to plot a four-mile-wide band to known landmarks and elevations. Then rough maps were drawn and a ground survey located the line to survey points and private property boundaries.[17]

The pipeline was planned to be predominantly surface laid except for two major underground sections. Originally designers also planned to bury the pipeline under large streams and rivers. After research exposed the dangers of variable water flows and deepening river channels, it was decided to attach the pipeline to ALCAN and Haines Highway bridges wherever possible. Where bridge crossing were not available, the pipeline was buried or raised over the water on trestles or catenary cables.[18]

3.3 Canada Route

Approximately 292 miles of the Haines-Fairbanks Pipeline crossed Canada in the Yukon Territory and British Columbia. Cooperation of the Canadian government was absolutely essential in constructing, operating and maintaining the project. There was precedence for the issue with previous projects such as the CANOL Pipeline and the ALCAN Highway. In the exchange of notes to work out details for the right-of-way authorization, the pipeline project was described as "a mutual defense interest of both countries."[19]

The United States first approached the Canadian government with a request to survey the proposed pipeline route on July 25, 1950. Canada gave its approval several weeks later. In July of 1952, the U.S. Department of External Affairs sent a memo seeking permission to build the line. The United States and Canada signed Treaty No. 20, "Haines-Fairbanks Pipeline," on June 30, 1953.

The treaty authorized operation of the Haines-Fairbanks Pipeline for 20 years. The government of Canada arranged "for the remission of duties and Federal taxes, on construction equipment, materials and supplies imported into or purchased in Canada, when consigned to the project and used in its construction."[20] If either government wished to terminate the agreement after 20 years, they were free to do so. The Permanent Joint Board of Defense was tasked with resolving disputes if either the United States or Canada disagreed about the need for continuing use of the pipeline.

Canada required that certain conditions be met in the construction and operation of the pipeline. The government was primarily interested in protecting its lands from environmental degradation and ensuring that Canadian labor and supplies were used in the construction, operation and maintenance of the pipeline in its country. The Canadian pump stations were operated entirely by Canadians.

[16] U.S. Army Corps of Engineers, *Products Pipeline, Haines to Fairbanks Alaska, Operating Manual*. Prepared by Fluor Corporation. May 1955.

[17] George, W. "The Alaska Pipe Line." *The Military Engineer*. Nov-Dec 1955. p 460.

[18] Ibid. p.461.

[19] Secretary of State for External Affairs, Canada to the Embassy of the United States of America. 30 June 1953.

[20] Note No. 227, Embassy of the United States of America, Ottawa, April 19, 1962 to Embassy of The Honorable, The Secretary of State for External Affairs, Ottawa.

3.4 Construction Contract

Invitations to bid on the pipeline construction contract were advertised September 15, 1953. Potential contractors were given one month to submit proposals. The government estimate for the job was $28,622,684. Only three bids were received – $29,001,287, $31,812,739.25 and $38,7784597.35. Williams Brothers (Tulsa, Oklahoma), McLaughlin Inc. (Great Falls, Montana) and Marwell Construction (Vancouver, British Columbia, Canada) won the contract as a joint venture with their low bid of $29,001,287.00.[21] Williams Brothers was the primary contractor.

3.5 Land Acquisition

The Army needed to acquire land for the pipeline right-of-way and pump stations. A 50-foot corridor was required for the 626-mile route. The pump stations varied in size from five acres at Junction and Donjek to 203 acres for the Haines Terminal. Overall, the pipeline occupied 2,404.34 acres.[22] Private property was acquired by a Declaration of Taking. Public lands were withdrawn by Public Land Orders.[23]

In contrast to the Trans-Alaska Pipeline built some 20 years later, there was no consultation with native groups for use of the land. The laws and regulations governing tribal consultation today were not yet in place. According to a report by Northern Land Use Research Inc., there were mixed reactions to pipeline construction among Tlingits in the Haines region. Interviews indicated that some thought the pipeline was important to national defense. Others appreciated the job opportunities created by the construction and operations. These reactions can in part be attributed to the perceived understanding that the Haines Terminal would be returned to the native people when the pipeline was closed.[24] However, some residents were decidedly against the project. As one elder stated:

> I do know that there were people fairly upset with what was taking place. And the major issue dealt with boundaries. The boundary issue just regarding the federal government coming in and doing whatever they pleased without even checking with the community. On how the land was used, who used it, who owned it…The only comments that I heard when I was a kid was the lack of respect regarding boundaries and the lack of being able to express one's opinion. Not knowing who you could go and express your concern Ψtoβ.[25]

The pipeline land in British Columbia and the Yukon Territory was "acquired by and remainΨedβ in the title of Canada."[26] The expense of obtaining the land was to be incurred by Canada. It is not known what price the Canadian government may

[21] "Joint Venture Built Largest Single Project." *Anchorage Daily News: Pipeline Edition.* 11 Oct. 1955.

[22] This figure includes the acreage added in 1961 when six additional pump stations were constructed.

[23] Defense Environmental Restoration Program, Formerly Used Defense Sites, Findings and Determination of Eligibility. Alaskan Petroleum Pipeline System, Haines-Fairbanks Division, Alaska. Property No. F10AK1016.

[24] McIntosh, S. J., Bowers, P. M., Higgs, A. S., & Williams, C. M. *Tanani Subsistence*. Report prepared for: Central Council Tlinget and Haida Indian Tribes of Alaska. Northern Land Use Research, Inc. March 2000.

[25] McIntosh, S. J., Bowers, P. M., Higgs, A. S., & Williams, C. M. *Tanani Subsistence*. Report prepared for: Central Council Tlinget and Haida Indian Tribes of Alaska. Northern Land Use Research, Inc. March 2000. p.33.

[26] Annex to Note No. 288, from the Embassy of the United States of America, June 30, 1953.

have paid to acquire the land for the pipeline corridor and pump stations, or if private property owners were affected.

The only known, documented discussion of native land right issues in Canada took place in the Yukon Territory, with regard to the Klukshu Indian Village. The village, located near Klukshu Lake, was used as a summer fish camp by the Champagne Indians. There were 118 residents in 1951. The fish camp was near the Haines cut-off road that connected Haines to the ALCAN Highway.

In 1951 the Klukshu expressed their desire for the creation of an Indian reserve. A letter by R.J. Meek, who worked in the Indian Affairs Branch of the Department of Citizenship and Immigration, stated that the Haines cut-off road had disrupted life at Klukshu Village. "Since the opening of the Haines-Cut-Off Road, access to the fishing station is easy…many visitors, tourists, and others drop in at the village to watch the fishing and drying."[27] The reserve was intended to protect the village from further disruption.

A survey was scheduled to take place in 1951, but due to a controversy over the exclusion of a church mission from the proposed reservation boundaries, the survey was not completed and the reserve was not created. In 1954 the request was renewed. The reserve was created in January of 1955. The Haines-Fairbanks Pipeline right-of-way was exempted from the boundaries. A 1954 letter to the Indian Affairs Director stated: "With regard to the oil pipe line now being constructed which will cross this land, I note with satisfaction that this line will not interfere with the use of the land by the Indians."[28] This is the only known discussion regarding possible impacts to native land use caused by the Haines-Fairbanks Pipeline. This consultation was taking place through Canadian administrators of the Indian Agency, Department of Citizenship and Immigration. Tribal consultation on a government-to-government basis was not yet practiced. [29]

3.6 Army Petroleum Distribution and the Air Force

Ninety to ninety-five percent of fuel transported via the Haines-Fairbanks Pipeline was consumed by the Air Force. Initially the only Army fuel deliveries were to Fort Greely. Fort Greely's combined fuel storage capacity was 74,500 barrels. The Ladd AFB and Eielson AFB storage capacity was 508,950 barrels. Even after Ladd AFB was transferred to the Army in 1961, the Fairbanks Terminal served more as surplus holding for the Air Force rather than for Army use.

The discrepancy in fuel consumption was a result of differing Army and Air Force missions and technology. Ladd AFB's Cold War missions centered on border patrol, strategic aerial reconnaissance, photo and electronic reconnaissance, and long range detection. Eielson AFB was a Strategic Air Command (SAC) headquarters. Air Force missions involved flights over Alaska, Canada and the Soviet Union

[27] R.J. Meet, Superintendent Indian Agency, Department of Citizenship and Immigration, to Indian Commissionor for B.C., Vancouver B.C. 28 May 1951. In Champagne and Aishihik First Nations, "Summary of the Non-native Activities in the Klukshu Reserve Area and Their Impact on Traditional Life: A Response to the Federal Offer Respecting the Klukshu Specific Claim." Appendix 2. 27 September 1994

[28] Champagne and Aishihik First Nations. "Summary of the Non-native Activities in the Klukshu Reserve Area and Their Impact on Traditional Life: A Response to the Federal Offer Respecting the Klukshu Specific Claim." Appendix 2, 27 September 1994.

[29] The Champagne and Aishihik First Nations believe the pipeline affected and disrupted traditional lifestyles and impacted Indian health. Their 1994 investigations concluded that environmental contamination from fuel spills and the aerial spraying of chemical defoliants exposed people, wildlife and vegetation to dangerous levels of chemical toxins. See "Summary of the Non-Native Activities in the Klukshu Reserve Area and Their Impact On Traditional Life: A Response to the Federal Offer Respecting the Klukshu Specific Claim." By Champagne and Aishihik First Nations. 27 September 1994.

using aircraft such as B-47s, B-52s, KC-97s and KC-135s, which consumed large amounts of fuel. On the other hand, Army Cold War missions, such as Air Force protection and cold weather training, did not require nearly as much fuel. Because the Air Force was the primary consumer, it provided most of the money for the pipeline operating budget through Operations and Maintenance Money Air Force. Remaining funds were procured through Operations and Maintenance Money Army.[30]

The Army reorganized and renamed its petroleum distribution system a number of times between 1955 and 1971. Initially pipeline operations were under the supervision of the Quartermaster Corps and were known as the Alaskan Petroleum Pipeline System.[31] Over the years the system was also known as The Alaska Petroleum Pipeline System, the Petroleum Distribution Office, Petroleum Distribution Division and the Petroleum Distribution Unit.[32] On July 1, 1974, the Petroleum Division was established as an element of the Director of Industrial Operations.[33] Headquarters were at Fort Richardson's Petroleum Distribution Office (PDO), Building 724. It was subordinate to the Director of Logistics of the Defense Supply Agency.

The pipeline was operated by federal, wage-grade personnel under the direction of the U.S. Army. Though most pipeline employees were civilians, some Army personnel were assigned at the pump stations for training and assistance when civilian labor was limited. Many early employees were recruited from the CANOL Pipeline. In fact, most of the station foremen were former CANOL workers. Their knowledge and experience was valuable to the newly operating Haines-Fairbanks Pipeline.

[30] Thomas Webster, interviewed by Kristy Hollinger. 29 October 2002. p. 2.
[31] "QM Corps to Supervise Big Pipeline." *Pipeline Edition: Anchorage Daily News.* 11 October 1955.
[32] *Alaskan Command Natural Resource Information Exchange* 11 Jan. 1971. On file at UAA Archives and Manuscripts Dept. U.S. Army Haines Fairbanks Pipeline.
[33] Pamphlet 360-1, *Description of Alaskan Military Petroleum Facilities.* 15 January 1982.

Chapter 4.0 Construction, 1953-1955

Construction of the Haines-Fairbanks Pipeline was a major undertaking that required detailed planning and organization. Supplies and equipment were procured outside Alaska and then distributed along the 626-mile route. Construction crews were strung along the right-of-way in two countries for nearly two years. The work was accomplished in extreme weather and terrain under a strict 22-month deadline.[34]

Figure 1. 10 Aug. 1954. Haines-Fairbanks POL pipeline area #3 (Harding Lake Area). Resident Engineer vehicle M-37 stuck in the mud – looking south. NARA.

4.1 Right-of-Way

The first step in building the pipeline was clearing a right-of-way. A 50-foot-wide corridor was needed along the 626-mile route. The center 30 feet were graded for pipeline placement. Williams Brothers subcontracted the Alaskan section of the job to Oaks Construction Co. of Anchorage and the Canadian section to Omack Company of Canada. Clearing work started in December of 1953 at Ladd Air Force Base in Fairbanks. Crews only had three hours of daylight at that time of year, so most work was initially done in the dark. Two additional crews were added January 1, 1954 — at Tok Junction and the Alaska-Yukon border. Crews cleared an average of one mile a day during the winter months. Severe weather stopped all but one team in February when temperatures dropped to 30 below zero. The single team continued working by covering its vehicles with tarps to trap engine heat. At night, kerosene lanterns were placed under the tarps to keep equipment from freezing.[35]

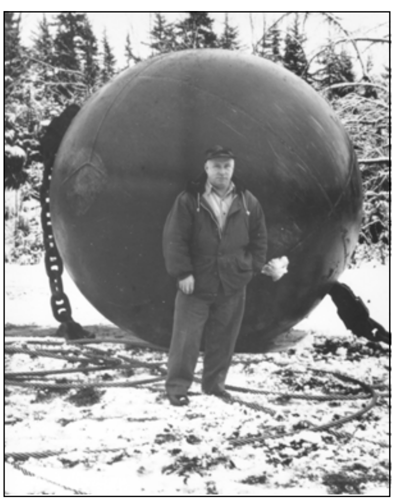


Figure 2. Ball used in clearing way for pipeline. NARA.

In summer the mud and floods were major problems for the clearing crews. Spring thaws combined with permafrost exposed from digging up the tundra turned the right-of-way into "an alleyway of gumbo."[36] The common practice of pushing all debris to the edges of the right-of-way worsened problems by blocking water drainage. An *Anchorage Daily News* article described the conditions:

> In muskeg and thawed permafrost areas, the track vehicle sometimes sank up to the hoods to become immobile as tracks failed to gain toe-holds on the icy bottom. On occasion a cat would drop out of sight and a thoroughly drenched skinner would scramble to high ground. Extra tractors were kept busy towing floundering equipment.[37]

---

[34] Huttlinger, J. "Contract Awarded for Strategic Alaskan Line." *World Petroleum*. Vol.24 No. 13. Dec. 1953.
[35] "50-Foot Right-of-Way Hacked Out of 626 Wilderness Miles." *Pipeline Edition: Anchorage Daily News*. 11 Oct 1955.
[36] "Mud a Major Problem for Line Builders." *Pipeline Edition: Anchorage Daily News*. 11 October 1955.
[37] Ibid.

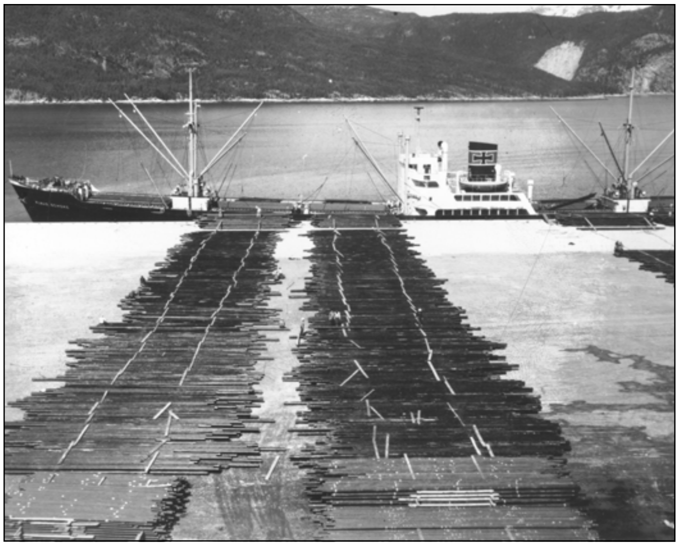


Figure 3. Unloading and stockpiling British pipe at Haines. NARA.

Figure 4. Push and Pull assistance was necessary to bring piping to the places needed in tundra swamp crossing. NARA.

> "Corduroy and temporary bridges were utilized to keep the pipe stringing moving forward. At one location in Canada, Koidern No 1 and South Fork, a temporary bridge was built to reach the Island between the two streams. Dick Woodring, stringing superintendent, tried out the trestle with a Cat. The west side of the structure gave way, dunking the super and the skinner into 9 ft. of icy water. Luckily no one was injured, and the drowned Cat was rescued by cables run from several pull Cats on the shore."
>
> —Excerpt from: "The ALCANGO Pipeline: Part 2 of 2" *Western Construction*. March 1955

A seven-foot-diameter steel ball was attached between two tractors to help clear trees and brush. The ball was filled with water and weighed ten to twelve tons.[38] The right-of-way clearing was finished in October of 1954.

4.2 The Pipe

The pipeline pipe was eight-inch-diameter, Grade A, seamless steel with a standard .277-inch wall thickness. Pipe slated for burial was slightly thicker at 0.322 inches. Alaska's section of pipe was from Jones and Laughlin at Aliquippa, Pennsylvania. The 8,300 tons of pipe made a 9,500-mile journey before arriving in ports at Haines and Valdez. Barges carrying 500 tons each made their way down the Ohio and Mississippi rivers to New Orleans where the load was put on freighters for the next leg of the journey. From Louisiana, it was a 7,500-mile voyage across the Gulf of Mexico, the Caribbean Sea, through the Panama Canal and then up the Pacific Coast. The journey took two weeks. Pipe on the Canadian section was from Scottish mills. It was shipped from England across the Atlantic and through the Panama Canal.

The pipe was unloaded on the Haines docks and rolled into stacks eight or nine pipes deep. From the docks, pipe was loaded onto logging trucks by Caterpillar D-6s for distribution along the route. The D-6s had Trackson Pipe Layer side booms rigged to them. Pipe was placed every five miles with trucks and skids. Trucks were unloaded with D-6s configured the same as those used for loading.[39] In rough areas tractors pulled and pushed the trucks through the right-of-way muck. Spacer gangs followed pipe distribution to line up and clamp pipe together for the welding crews. A 1/16-inch gap was left between the pipe segments.[40]

It was impossible to make the pipeline follow an exactly straight line. The pipe had to be bent in many locations to accommodate curves and turns in the route. Bending the pipe was accomplished on site using Caterpillar D-6 tractors with side booms.

[38] CRREL (1977) *Haines-Fairbanks Pipeline: Design, Construction and Operation*. Special Report 77-4. p. 6, 7.

[39] Ibid. p. 6

[40] "The ALCANGO Pipeline: Part 2 of 2." Western Construction. March 1955. p.35.

Figure 5. Laying pipe for underwater crossing. NARA, A4-3826.

Figure 6. Pipeline construction. NARA.

Figure 7. Pipe welding. NARA, DA 573 #373.

Most of the pipeline was laid directly on the ground except for two major sections that were placed underground. These were a 40-mile segment north of Haines and a 100-mile segment south of Fairbanks. The Haines section was buried to protect the line from rockslides and avalanches in the mountainous terrain. The Fairbanks section was buried through military maneuver areas.[41]

Though the Haines ditching operations required drilling through solid rock, burying the line near Fairbanks was more difficult because of the permafrost. Ditch digging for pipe placement required a minimum burial depth of at least seven feet. Most pipe was buried at nine feet, and some as deep as fifteen feet. Cleveland 320 trenching machines were altered to accommodate the permanently frozen ground. A smaller wheel with more buckets was used so that the ditcher operated continuously with less jarring action on the equipment. The permafrost wore out the specially treated steel teeth on the buckets. The teeth had to be replaced twice a day.[42] It took an average of 12 hours to dig one mile of pipeline trench. In the summer, ditchers ran 24-hours a day, six days a week, with Sundays devoted to routine repairs.[43]

As the pipe was spaced along the right-of-way, welding crews followed to fuse the pipe lengths together. The work started April 19, 1954. Welding was carefully monitored throughout construction. The pipe metal was constructed softer than normal because of the cold temperatures the line would be exposed to. Soft pipe is more difficult to weld and many applicants failed qualifying employment tests. Finding enough welders for the job and keeping men on the job after they started were challenges.

In many places the right-of-way was flooded by up to three feet of water. Work continued with men working in icy, waist-high water. Hip boots were standard equipment. Where the right-of- way was flooded, laborers welded sections of pipe together and floated them into position. The pipe was anchored to the ground with 480-pound concrete weights – made as needed. The route also required many stream and bridge crossings. The regular welding crews bypassed these tricky areas in order to maintain a rapid pace. Tie-in crews finished the work later. Pipe for underground burial was welded and

[41] "Ingenious Method Used for Burial of One-Fourth of Line." *Pipeline Addition: Anchorage Daily News.* 11 Oct 1955.
[42] "The ALCANGO Pipeline: Part 2 of 2." *Western Construction*. March 1955. p.35.
[43] "Ingenious Method Used for Burial of One-Fourth of Line." *Pipeline Addition: Anchorage Daily News.* 11 Oct. 1955.

Figure 8. Area 2. Mile 1173, Yukon Territory, Corps of Engineers inspection vehicle mired along pipeline right-of-way. NARA.

then placed in the ditch. The soil was backfilled as quickly as possible to prevent exposed permafrost from thawing. Normally in permafrost-free areas outside Alaska, pipe was placed in the ditch and then welded.[44]

Teams of radiographic inspectors followed the welders to check for faults in the weld joints. They checked a random 15% sample visually and with x-ray equipment. The U.S. Army Corps of Engineers contracted the work to Isotope Products of Texas and Edmonton, Alberta. Isotope Products took gamma graphs using the radioactive pill method. The initial inspections revealed many faults, and Lincoln Welding Co. was hired to bring up more qualified welders from Oklahoma and Texas.[45] The work progressed rapidly after that, and in one record-setting day, the Canadian team completed 426 welds in one 12-hour shift.[46]

Figure 9. Tok terminal under construction, 1954. NARA.

4.3 Pump Stations

Marwell Construction Company built the pump stations in Canada and Alaska. The pipeline was initially designed with five stations at Haines, Border, Haines-Junction, Donjek and Tok. Haines and Tok were also equipped with bulk fuel storage facilities known as tank farms. Tank farms were already present at Fairbanks and Eielson Air Force Base. The Fairbanks tank farm was built during W.W.II to store fuel shipped by the CANOL Pipeline.

The pump station construction work was carefully planned and coordinated with supply deliveries. Construction specifications detailed exact locations of machinery and equipment in buildings and around the station. Over 2,100 drawings were prepared. When changes to the plans were required, they were done on site.[47]

All pump stations were designed to be self-supporting communities. They were equipped with their own heating, water, electrical and sewage systems. Living quarters were provided for the operators and their families. These consisted of two or

[44] "Tanker Arrives in Alaska…Delivers First Fuel for Line." *Oil and Gas Journal*. 20 June 1955.
[45] "The ALCANGO Pipeline: Part 2 of 2." *Western Construction*. March 1955. p.35.
[46] Ibid. p.35, 38.
[47] "Joint Defense Plans Served by Alaska Products Pipe Line." *Oil in Canada.* Vo. 7, No. 48. 26 Sept 1955. pp. 62-72.

three bedroom apartments and bachelor quarters at Haines and Tok. Every station also had at least two fuel storage tanks to supply the equipment and vehicles.

Building conditions at the five pump stations varied according to the sub-surface soil. Tok Terminal was the easiest to build due to the presence of two feet of silty topsoil overlaying gravel. Donjek was the most problematic because of unstable soils and the presence of permafrost to varying depths. The pump building foundation had to be excavated 12 feet underground. The bottom four feet were backfilled with compacted gravel.[48]

The pumps at every station were laid on concrete slabs. Vibration pads were placed around the concrete to insulate the building from the jarring action of pumping equipment. The Donjek Station concrete slabs were eight feet thick.[49]

4.4 Construction Working and Living Conditions

There was pressure to complete the pipeline as quickly as possible. The job urgently needed to be completed before the start of another winter. The pressure led to a fast work pace, particularly during the summer when crews were put on 12 hour shifts seven days a week to take advantage of the extended daylight hours. Conditions were too much for some. Though the number of workers brought in from outside is unknown, many men quit and returned to the Lower 48.

Figure 10. 24 Sept 1954. Contractor's Camp at Mosquito Lake 25 miles from Haines. NARA.

Two mobile camps or 'spreads' were used to support construction work – one in Canada and one in Alaska. The Alaskan spread started in Fairbanks and the Canadian spread started on the Alaska/Canada border. Each crew had 140 employees on average.[50] During peak construction in 1954, the workforce swelled to 775 employees, with 500 men working on the pump station construction.[51] Catering services and a fleet of trailers used as bunkhouses, mess hall, kitchens, showers and offices supported employees. Canus Services Inc., the catering company, served three meals a day. Breakfast was at 5:00 am, dinner at 7:30 pm, and packed lunches were provided to eat on the job.[52]

The mobile camps moved with the men as work progressed – generally at 50 to 70 mile intervals. Everything was designed to move in one overnight trip. Smaller camps were arranged as needed when work lagged from difficult conditions. Commercial logging facilities could also be used for small crews staying behind the main spreads. Crews kept in contact with each other and the main offices by two-way radios. Stationary camps were set up at the five pump station sites.

The international agreement between the United States and Canada required that supplies and labor for the Canadian section of the pipeline be obtained from Canadians. This agreement appears to have been strictly adhered to, as everything from

[48] Ibid.
[49] Ibid.
[50] "Two Contractor 'Spreads' Sped Work." *Pipeline Edition: Anchorage Daily News*. Oct 11 1955.
[51] Judah, M. A. "Alaskan Products Line Completed." *Pipe Line Industry*. 4:3 (Oct 1955) p.48.
[52] "Pipeline Construction Crews Had Trailer Living Quarters." *Pipeline Edition, Anchorage Daily News* 11 Oct. 1955.

the pipeline pipe to metal for construction of pump station buildings was purchased from Canadian sources.

4.5 Dedication Ceremony

When the Haines-Fairbanks Pipeline was completed in 1955, a dedication ceremony transferred management responsibilities from the contractors to the military. The ceremony took place at the Haines Terminal on October 12. Alaska's top Army and Air Force officers were in attendance, along with Governor Frank Heintzleman and Canadian officials. During the ceremony Brigadeer General D.H. Tulley, Assistant Chief of Engineers for Military Construction stated, "The ALCANGO may well prove to be a deciding factor in some future wartime operation."[53] The project engineers thanked those involved in the construction and praised the U.S. and Canadian governments for cooperating to build the project.

The end cost of construction was $38,249,796.00. This was 32% over the original $28,622,684.00 construction bid.[54]

Figure 11. Haines-Fairbanks Pipeline construction. NARA.

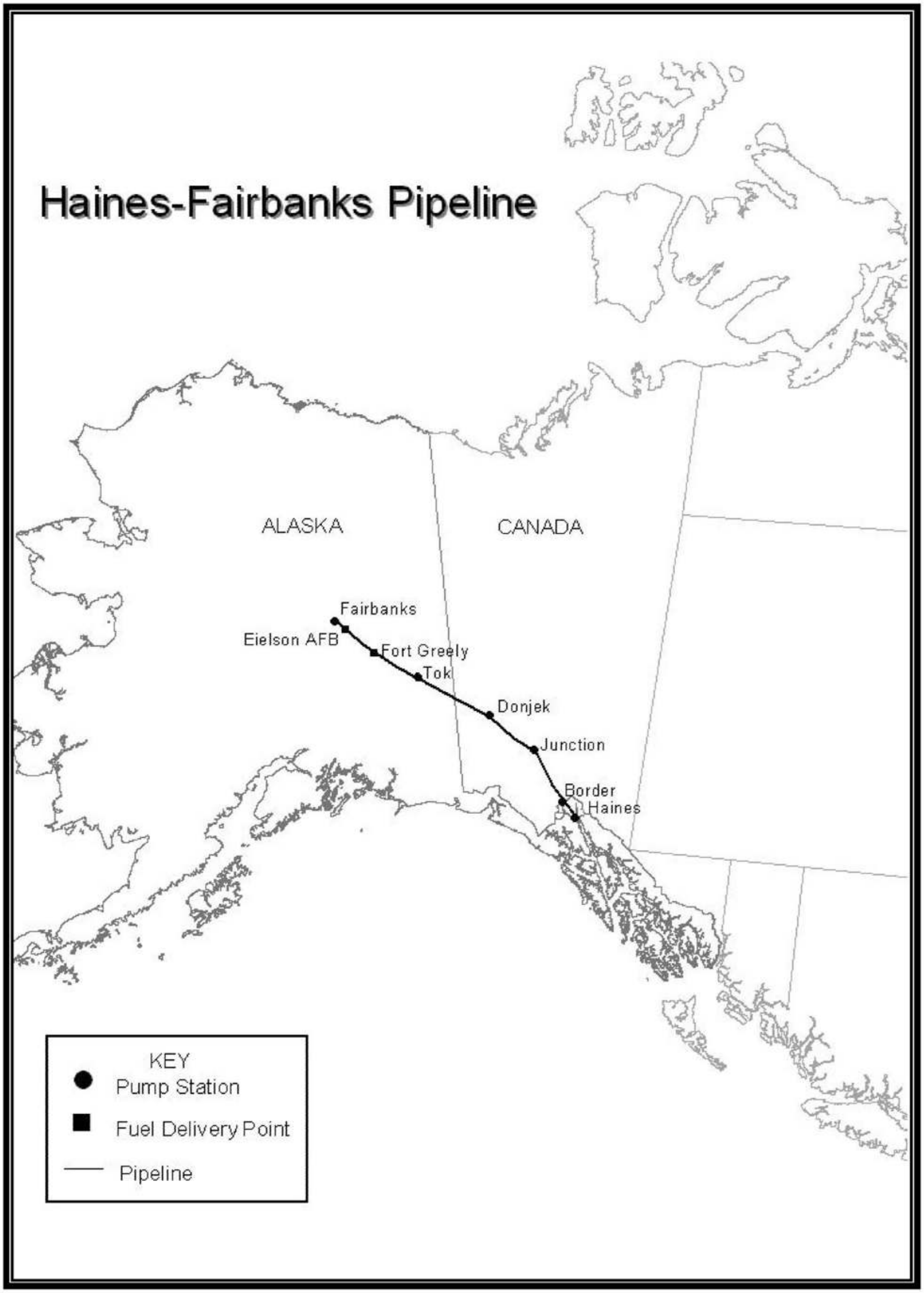
Figure 12. 1954, Mile 28. Workers assemble on highway.

Figure 13. Tom Nelson, superintendant of the Haines-Fairbanks $40,000,000 POL pipeline, explains to distinguished military guests how the great ALCANGO 626-mile pipeline carries the different fuels, jet and aviation, motor and diesel, to military bases in the interior. L to R; Maj. Gen. James F. Collins, Commanding General USARAL; Brigadier H. L. Meuser, Commander, Northwest Highway System, Canada; Brig. Gen. Hugh Mackintosh, Columbus General Depot, Quartermaster Corps; Lt. Gen. J. H. Atkinson, USAF Commander in Chief, Alaska; Commissioner, F. H. Collins, Yukon Territory, Canada. U.S. Army photograph, Sheldon Museum Collection, Haines, Alaska.

> "There is the story of three inspectors who were walking along the right-of-way and glancing over their shoulders periodically for bear protection. When a bear showed up on the left, the inspector on that side made for a tree without wasting time to yell. The other two continued walking until the second man in file saw the bear and went up another tree. A few seconds later the third man noticed the bear when he glanced back and went up a third tree. The inspection team carefully maintained their altitude until a side-boom tractor came by and routed the bear."
>
> — Excerpted from "Products Line Completed."

[53] Photo caption; US Army photo. Alaska State Archives. Record Group 101. Office of the Territorial Govenor, Series 130.

[54] D.E. Garfield, C.E. Ashline, F.D. Haynes and H.T. Ueda. *Haines-Fairbanks Pipeline Design, Construction and Operation*. February 1977.



Map 2. Haines-Fairbanks Pipeline: 1955 – 1961.

Chapter 5.0 Facilities and Operations, 1955-1961

From 1955 to 1956, the pipeline was staffed to minimum levels. As stated in the 1957 ALCOM report, "The maintenance of the pipeline by the Army was considered the loneliest job one could be assigned. Many times difficulty was experienced in keeping stations manned."[55] In August of 1956, for example, there were still 18 unfilled positions at the Haines Terminal alone.[56] Tok was operating with just seven employees in 1955. Former employee George Lyle remembered, "I was working 12 hours seven days a week. Yeah pretty near all winter we worked 12 hours seven days a week… it helped out on the paycheck. But it got a little old!"[57] The staff shortage led planners to recruit a number of workers from outside. They also hired people with no former pipeline experience to train on the job.[58] Maintaining a qualified workforce was an issue for the duration of operations.

The pipeline was designed as a multi-product system to transport four fuel products: aviation gas, jet fuel, automotive gas and arctic grade diesel. Five pump stations moved the fuel through the pipeline. They were located strategically to push fuel over higher elevations along the route. Six booster stations were added to the system in 1961 to increase the pumping capacity.

Fuel was pumped through the pipeline in two stages: from Haines to Tok and then Tok to Fairbanks. Bulk fuel storage facilities, known as tank farms, were located at Haines and Tok to hold fuel before pumping it through the pipeline. Tank farms were also present at the fuel delivery points on Ladd AFB (Fairbanks), Eielson AFB and Fort Greely.

The system was designed to operate under four phases: normal, emergency, increased emergency and full capacity. Normal and emergency only called for use of the three main stations: Haines, Border and Tok. Increased emergency and full capacity outputs used all the pumping stations.

The pipeline pumped 9,600 barrels per day under standard operations. Maximum output was as high as 16,500 barrels per day if the booster stations at Haines-Junction and Donjek were put on line.

5.1 Line Freeze-Up

Though pipeline construction was completed in late 1955, it was not until 1956 that full-scale operations commenced. In 1955 the construction engineers tested the pipeline with water instead of fuel to check the integrity of the line. The rationale was to prevent the costs and hazards associated with the loss of fuel if leaks occurred. No major ruptures developed during the test, and the pipeline was transferred from the contractors to military.

[55] "History of the Alaskan Command, 1 July 1956 – 30 June 1957." Prepared by the Office of Information Services Alaskan Command.
[56] Keith H. Ewbank, Colonel, GS, HQ USARAK, Office of the Chief of Staff to B. Frank Heintzleman, Governor of Alaska. Alaska State Archives.
[57] George Lyle, interviewed by Kristy Hollinger. 21 July 2002. p.14.
[58] Johnny Burnham, interviewed by Kristy Hollinger. 7 May 2002. p. 5.

Figure 14. Pipeline break located near MP 498.8. Break was discovered during test period and was repaired. NARA.

The new operators quickly discovered, however, that testing the line with water was a costly and time-consuming mistake. In November 1955, the weather turned very cold. Temperatures reached minus 30 at Border Station and minus 60 at Tok Terminal. Haines was pumping jet fuel at 800 pounds per square inch (psi) when at about 2:00 am all pump stations started losing pressure. Haines responded by increasing the pressure to 1,000 psi, but Tok was still only receiving a dribble of fuel. Ray Carder at the Haines Terminal ordered the shutdown of the line. Batch Elder was the general foreman of the pipeline at that time. Ray remembers, "I went in and woke him and announce(d) the news that the pipeline was in my opinion, froze up – he couldn't believe it…..Batch held his head between his hands for a while and said, 'They told me I couldn't have freeze-up on this line'."[59]

It was discovered that the water used in testing had not been completely purged from the system and had settled in the pipe at lower elevations along the route. The low temperatures froze the water into solid chunks of ice, and the fuel was unable to pass over or push it through the system. It took about six months before pumping operations could resume.

All the ice had to be physically removed from the pipeline. The work began in January of 1956. The first step was locating the ice blocks. The pipeline was put under pressure of 1000 pounds per square inch (psi) and pressure irregularities were noted. A person then walked the line near the low-pressure areas and tapped the pipe with a 10-pound hammer. The absence of a sharp ringing sound indicated an ice blockage. Once the ice was located, brush fires were lit underneath the pipeline to loosen the ice. Then the pipe was cut and the open end was directed towards the right-of-way edges. Pressure was put on the line and, as pipeline employee George Lyle described, "it would shoot out these big icicles: twenty, thirty feet long and eight inches in diameter."[60] The fuel and ice were discharged straight onto the snow-covered ground and left to evaporate. Attempts were made to cut the pipeline away from areas where discharged fuel might leak into the watershed.

The pipeline was cut in 28 locations over a 176-mile section. The amount of fuel lost during the operation varied at each location. Several former employees recall seeing pictures of ice removed from the pipeline stacked up like cordwood along the right-of-way.[61] The last cut was made on March 16, 1956.[62] A valuable lesson was learned; water should not be used to test the pipeline in such a cold climate. After this initial freeze-up, the Haines-Fairbanks Pipeline operated without major interruption for over 15 years.

[59] Ray Carder, interviewed by Kristy Hollinger. 8 April 2002.
[60] George Lyle, interviewed by Kristy Hollinger. 12 July 2002. p. 2.
[61] Ray Carder, interviewed by Kristy Hollinger. 8 April 2002. p. 9.
[62] Rickard, Warren and Deneke, Frederick. *Preliminary Investigations of Petroleum Spillage, Haines-Fairbanks Military Pipeline, Alaska*. Cold Regions Research & Engineering Laboratory. April 1972

5.2 Tankers and Fuel Delivery

The pipeline system essentially began with Military Sea Transportation Service (MSTS) tankers and their delivery of fuel in Lutak Inlet at Haines. The tankers were loaded with refined fuel in California or Washington. The journey to Alaska took about five days. The tankers were often transporting fuel to Whittier and Kodiak as well.

MILITARY SEA TRANSPORTATION SERVICE (MSTS)

The Military Sea Transportation Service was created on August 2, 1949, to centrally manage all Department of Defense ocean transportation needs. During W.W. II four separate agencies managed ocean transport. A need for centralized control of military shipping was identified and the MSTS was the result. The MSTS was renamed the Military Sealift Command in 1970. It continues to operate today. It is a service of the United States Navy.

Lutak is a deep-water, ice-free inlet. A T-shaped concrete dock was built for the pipeline system. The dock was capable of mooring a 26,000 dead-weight-tonnage tanker. There were two dolphins, 780 feet apart, to hold the ship against spring fenders. The dock was equipped with a dockmaster's office where an employee monitored the tanker arrivals. There were also two pumps located on the dock in case the tanker's pumps malfunctioned.

Before fuel could be pumped from the ship, it had to be tested for contamination. A lab employee drew samples from the cargo holds and performed tests at the station's lab to make sure the product was clean. The testing process took from three to eight hours. Pure, uncontaminated product was critical for jet fuel and aviation gasoline. Poor fuel quality could cause a plane crash. The lab did a good job of monitoring the fuel quality and, as the lab foreman Frank Haas stated, they "never had an airplane crash because of contaminated fuel."[63]

Fuel was rarely found to be contaminated or impure. On one occasion a new crewmember accidentally opened the wrong valve in the cargo hold and mixed two different types of fuel. The mistake was immediately identified and the fuel was shipped back to the Lower 48 for re-refinement.[64]

Figure 15. Fuel tanker docking at Haines. NARA.

No one interviewed for this study recalled any shipwrecks occurring on voyages for the Haines-Fairbanks Pipeline fuel deliveries. This is not to say that it was always smooth sailing. Ships docked in all kinds of conditions: through rain, sleet, snow and wind. Navigation could be complicated further when the cold, damp air iced up the tankers. Ray Carder recalls a cold spell when this occurred:

> Well, the temperature was down to around ten or fifteen below zero with the north wind blowing out there the way it is now, only I guess worse, and...(they) iced up all over the ship. And I mean when

[63] Frank Haas, interviewed by Pam Moore, tape #92.210.01, transcribed by KM, April 1999. On file in the Sheldon Museum Archives, Haines, Alaska. p. 12.

[64] Ibid.

> it ices up, there's ice that big around all over the cables, the catwalk that went across the well deck, you could barely get across it unless you walked sideways. The ice was that thick. But that wasn't the first tanker that had come in in that condition.[65]

Another problem tankers faced was maneuvering in the tricky tidal currents of Lutak Inlet. Sometimes an airplane would be used to guide the ship in. A tanker also occasionally hit the dock when trying to navigate its landing. Frank Haas recalled one incident:

> We were standing waiting for the ship to shear off, as it normally did, and he was coming almost straight at the dock, and you know, we're used to the ships and they would come in, and they would kick it in reverse, and just fall off to the side. And we're standing and we're watching a while, Enterlin's eyes are getting bigger, and finally the Chief Mate, a fellow named Kirkpatrick, was standing right on the bow, didn't raise his voice. He just looked at us and said, "You know, if I was you guys, I'd get the hell out of there." Mass exodus of eight men. I was accused of running over one fellow and spinning my feet a couple of times. They claimed that's why he went bald.[66]

Fortunately there was no fuel in the tanker at that time or sparks could have ignited a serious explosion.

The ships had crews of approximately 30 to 40 men. Many of the tanker captains were W.W.II veterans who ferried fuel across the Atlantic to the European theater. The Haines station foremen were often invited aboard the tankers to dine with the captain. Ray Carder, the Haines foreman, remembers that the meals were excellent.

A tanker arrival meant an increased pace of work for the Haines Terminal workforce. When a ship arrived, the station men helped secure it to the dock with steel cables. Then, during the entire unloading operation, men were kept on fire watch. Preventing the fuel from sparking at this stage was very important. The dock was equipped with a fire foam protection system in case there was an explosion. Once pumping from the ship began, it continued non-stop around the clock until all holds were emptied. The rate of pumping varied according to ship and the experience level of its captain and crew. A skilled crew might have the holds emptied within 12 hours. On average though, the tankers were in Haines for a day and a half. Fuel shipments varied over the years according to military needs. There were probably one or two tankers arriving at Haines every week during peak operations. Normal output called for one tanker shipment every week and a half.

5.3 Ship to Shore—Haines Terminal

The tankers pumped fuel from the ship into pipes leading from the dock to the manifold building at the Haines Terminal (see Figure 16). There were four ten-inch pipes – one for each type of fuel. There was also a six-inch pipe for kerosene. Designers originally planned to use a kerosene buffer between the fuel batches.

[65] Ray Carder, interviewed by Kristy Hollinger. 8 April 2002. p. 12.

[66] Frank Haas, interviewed by Pam Moore, tape #92.210.01, transcribed by KM, April 1999. On file in the Sheldon Museum Archives, Haines, Alaska.

Figure 16. Pipes leading from Haines dock to manifold building. NARA.

Operators quickly determined, however, that the fuel interface could be controlled without the kerosene buffer.

In the manifold building, fuel was routed to specific storage tanks. All fuel was pumped from the ships to the tank farm before going into the pipeline. Fuel storage served multiple functions. First, it allowed tankers to discharge cargo quickly and efficiently, without worrying about batch schedules. Second, storage allowed any water and/or sediment in the fuel to separate and settle on the bottom of the tank. The presence of water in the fuel was harmful because it could corrode the pipeline and contaminate fuel. Finally, fuel storage permitted tank gaugers to take a more accurate inventory of the product delivered.

The manifold equipment at Haines was originally left outside, with no protection except for a roof. During the first winter of operations snow drifts buried the valves, which were in an open underground pit. It took three days to dig out the valves. The next summer, a more appropriate, fully enclosed building was constructed over the manifold equipment.

Figure 17. Haines Terminal. NARA.

Table 2. Tank farm capacities.

TANK CAPACITY

Station	*Number of Tanks*	*Barrels Per Tank*	*Total Capacity Barrels*	*Total Station Capacity*
Haines Terminal (1,2)	1	110,000	110,000	390,000
	9	30,000	270,000	
	2	5,000	10,000	
Tok Terminal	9	30,000	270,000	285,000
	3	5,000	15,000	
Fort Greely	2	15,000	30,000	74,500
	4	10,000	40,000	
	2	2,250	4,500	
Birch Lake (3)	2	6,600	13,200	13,200
Fairbanks Terminal	2	25,000	50,000	204,950
	14	10,000	140,000	
	4	2,250	9,000	
	3	1,190	3,570	
	4	595	2,380	
Eielson Air Force Base	5	30,000	150,000	304,000

1. The 110,000 barrel tank at Haines was added to the station in 1964.
2. The Haines and Tok tank farms had 5,000 gallon tanks because originally the pipeline design called for use of a kerosene buffer between the fuel tenders. Operators discovered that the fuel interface could just as easily be managed without the kerosene buffer, and the tanks were used for regular fuel storage.
3. The tanks at Birch Lake were added to the pipeline in the late 1950s for strategic emergency diesel and automotive fuel storage.

5.4 Pumping to Tok Pump Station

As dictated by the pumping schedules, fuel went from storage tanks back to the manifold building where it was then routed to the mainline pump building. On the way the fuel passed through Warner Lewis water separators and Moorlane strainers as a final precaution against introducing water into the system. In the mainline pump building, fuel entered the eight-inch pipeline and started the journey north. The building was divided into an engine room, pump room and control room. The control room was isolated from the engine and pumping areas by a firewall. The room was pressurized to protect workers from breathing harmful petroleum fumes. The pump room housed three Wilson Snyder quintuplet pumps which pushed the fuel through the pipeline. Each pump was driven by a 285 horsepower Chicago-Pneumatic diesel engine (6 cylinder, 4 cycle, 720-420 RPS).

The next pump station was 48 miles from Haines, on the U.S.-Canadian border. The station, called 48-mile or Border, had the heaviest pumping load on the pipe-


Figure 18. Donjek Pump Station. NARA.

line. The highest elevation on the route was at mile 57. Border had to push the fuel over that 3,750-foot rise. Border was critical to the pipeline system and for this reason the station was larger than the other booster stations at Junction and Donjek. The 32-acre site included a mainline pump building, utility building, warehouse-garage-shop building, family housing and a cold storage locker. The pump building housed three pumps and three Chicago Pneumatic diesel engines to drive the pumps. There was a 5,000-gallon storage tank to supply the station's fuel needs. Housing consisted of two apartment buildings: one with six two-bedroom units and one with six three-bedroom units. There was also a dormitory building with a ten-man capacity.

From Border, the Junction and Donjek pump stations could be brought on line to increase the fuel output to Tok Terminal. Junction and Donjek had similar facilities. Each five-acre station consisted of a mainline pump building, utility building and family housing. The pump building housed two pumps and two diesel engines. Housing consisted of one apartment building and one single-family residence for the station foreman.

5.5 Tok Terminal

Tok Terminal was a major component of the Haines-Fairbanks Pipeline. At Tok fuel was temporarily diverted from the eight-inch line to the tank farm for storage before progressing to Fairbanks. Storing fuel at Tok it made it easier to send smaller, better-managed batches of fuel north as needed. It was only 194 pipeline miles from Tok to Fairbanks as opposed to the complete pipeline route of 626 miles. Storing the product at Tok provided a last opportunity for water and sediment to settle out of the fuel. The Tok tank farm had a 285,000-barrel capacity.

Operating Tok Terminal involved many of the same functions as at the Haines Terminal, minus the tanker deliveries. The station was receiving, storing and pumping fuel. Foreman Johnny Burnham described a typical day:

> Well, you got your pumping orders from wherever the headquarters was at, either Haines or down at Fort Richardson. And the pumping orders would tell you if you were going to pump fuel or receive fuel or just hold pressure on the line. For instance, if you was going to receive fuel they would tell you at what time the other pump stations south of us would go on the line, and tell us what back pressure to hold on the line, which could be anything from 50 pounds to 600 pounds of back pressure that you would hold. If you was going to pump of course they would tell you, the pumping orders would tell you at what pressure to pump at and what product to move and so on like that.[67]

[67] Johnny Burnham, interviewed by Kristy Hollinger. 7 May 2002. p. 1.

Fuel entered the mainline pump building via the eight-inch pipeline. From the pump building a line led the fuel to the manifold and transfer pump building where the product was transferred back and forth from the tank farm. The manifold building housed the valves and piping leading to each storage tank, three Warner Lewis water separators, three motor-driven centrifugal pumps, a 600-gallon products sump tank and two positive displacement meters.

Once fuel arrived at the manifold building from the mainline pump building, it was routed to the tank farm. Each storage tank was attached to the manifold building by an eight-inch pipe. Opening the appropriate valves in the manifold building allowed fuel to enter the pipe leading to a specific tank. The pumps in the manifold building assisted the flow of fuel up the hill to the tank. The tank volumes were calculated in advance and when filled, the valves leading to the tank were closed and valves leading to another tank were opened.

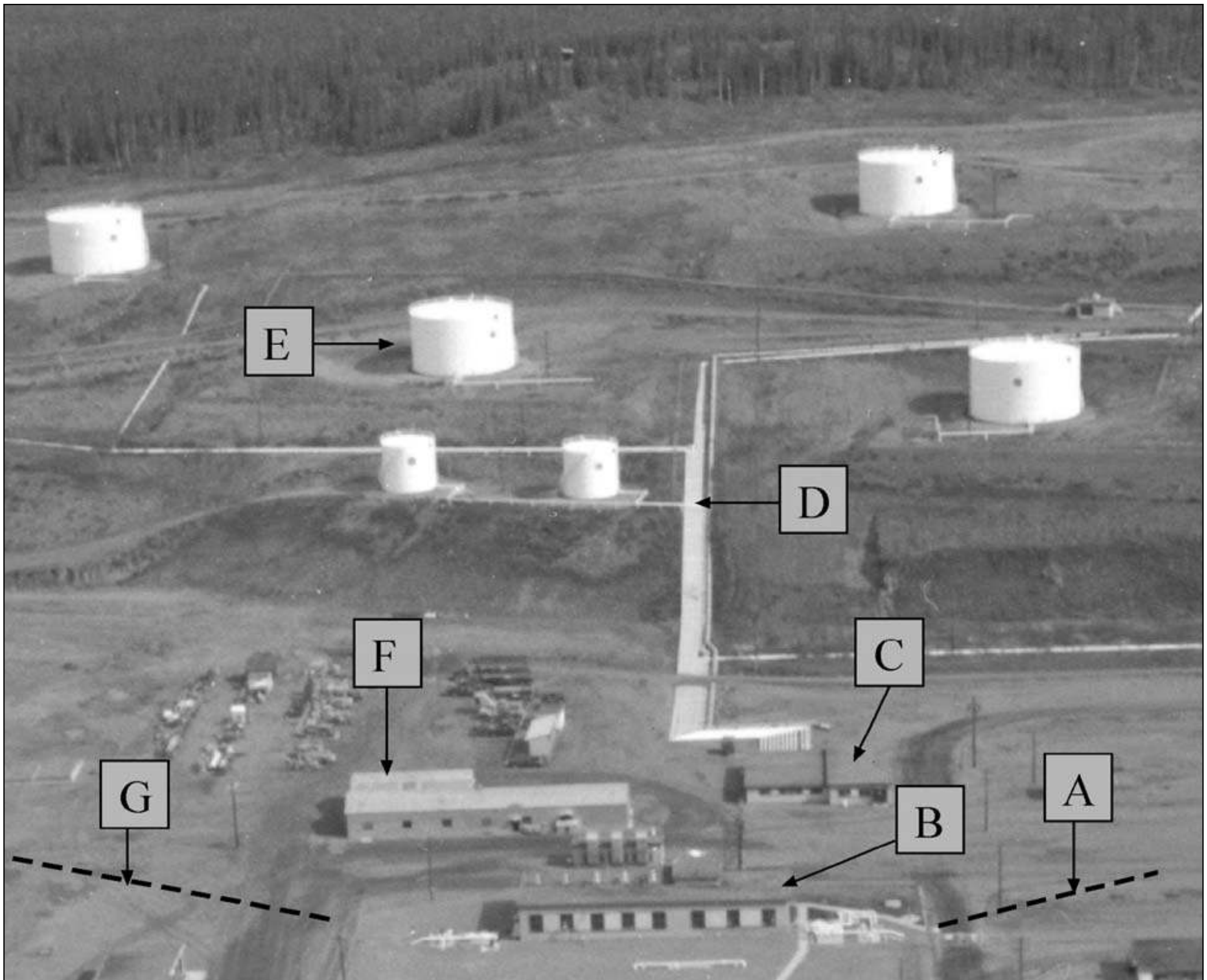
Figure 19. Tok Terminal. NARA.

Each tank was equipped with a 40-foot swing line for filling and withdrawing the product. As fuel flowed up to the tank farm, tank gaugers were on hand at the tank to operate the swing line. Filling the storage tanks required careful and constant monitoring. The swing line was placed just below the product level in the tank and was raised as the tank filled. This prevented static electricity from igniting a spark.

To supply the pipeline from the tank farm, the operation was reversed. The tank gauger positioned the swing line just below the product line and fuel was drained from the tank. It was important that gaugers kept the line as far from the tank bottom as possible to avoid drawing sediment and water out of the tank. Since the tanks were on a hill, gravity assisted the fuel flow back to the manifold building. In the manifold building the product was routed through a Warner Lewis water separator and into a pipe leading back to the pump building.

The Tok pump building was similar to the one at Haines. It was divided into a pump room, engine room and control room. The control and engine rooms were separated from the pump room by a firewall and had a pressurized air system. Three Wilson Snyder quintuplet pumps driven by Chicago-Pneumatic diesel engines propelled the product through the pipeline. The diesel engines were connected to a water cooling system in the adjacent radiator building.

Tok Terminal was also connected to the CANOL Pipeline. The CANOL was still pumping fuel north to Fairbanks. A three-inch line led from the pump building to the manifold building for fuel arriving or exiting via the CANOL. The tie-in was only used for several years before shutting down.



LEGEND

A. Pipeline (underground) feeds fuel into the pump building.
B. Pump Building. In the pump building fuel is routed to the manifold & transfer pump building.
C. Manifold & Transfer Pump Building. Opening the appropriate valves leads fuel to storage tank in tank farm. Every storage tank is connected to the manifold building by a separate pipe.
D. Pipes lead from the manifold building to every storage tank in the tank farm.
E. Fuel fills storage tank. Then, to supply pipeline with fuel for northern delivery, fuel travels back down the pipe to the manifold building where it is routed to the pump building and into the pipeline.
F. Radiator Building. Contains radiators to cool the diesel engines running the pumps. Underground piping feeds cold water to circulate around the engines.
G. 8” pipeline (underground) leads from pump building north to Fairbanks.

Figure 20. Tok Terminal Flow Diagram.

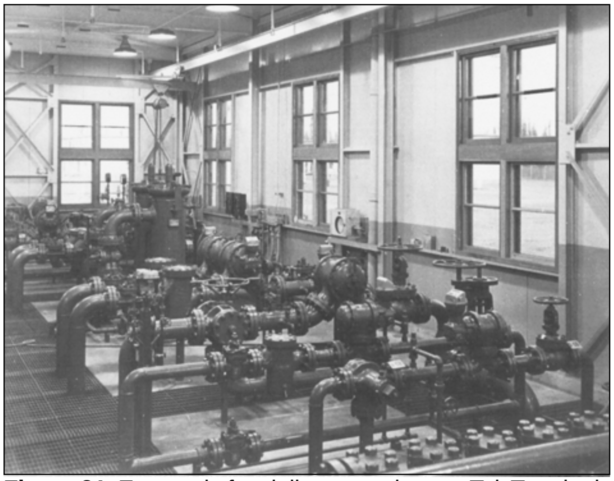


Figure 21. East end of mainline pump house. Tok Terminal. Courtesy George Lyle.

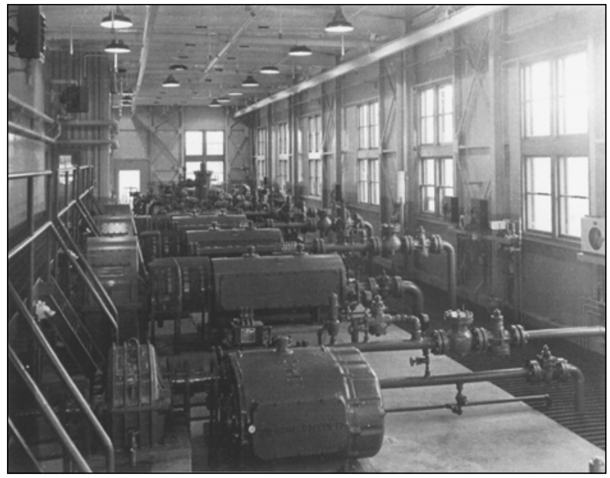


Figure 22. Mainline pumps. Tok Terminal. Courtesy George Lyle.

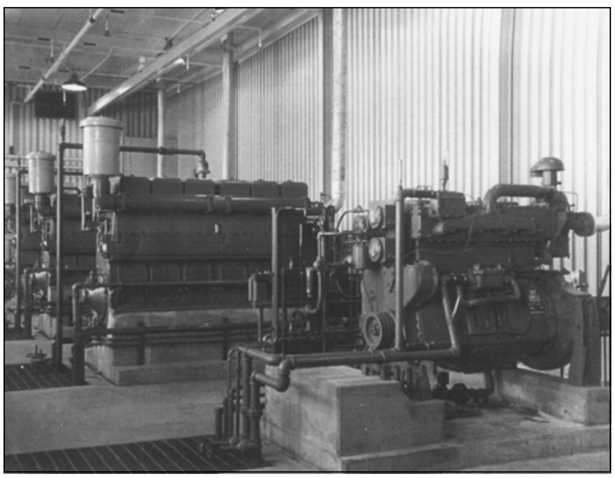


Figure 23. Mainline pump engines. Tok Terminal. Courtesy George Lyle.

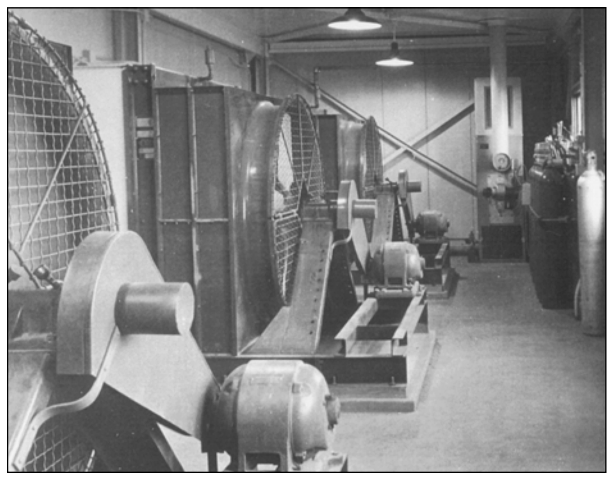


Figure 24. Fans in radiator building for cooling mainline pump engines. Tok Terminal. Courtesy George Lyle.

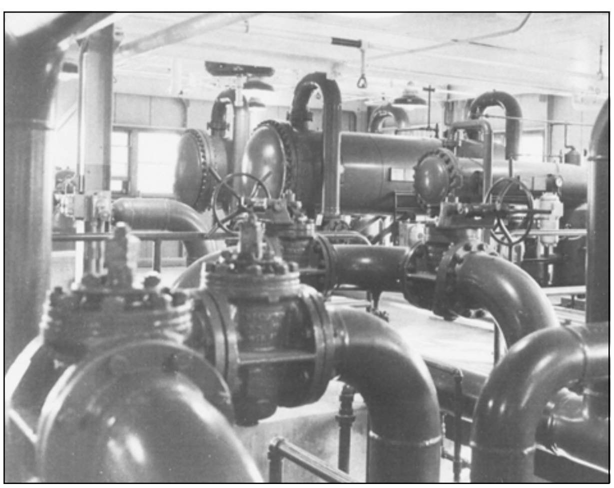


Figure 25. Manifold and transfer pump building interior. Tok Terminal. Courtesy George Lyle.

Figure 26. Pipes leading from manifold building to tank farm. Tok Terminal. NARA.

5.6 Headquarters

Operation of the pipeline was "a coordinated effort of all the stations and station operators."[68] Fort Richardson's dispatch division in the Petroleum Distribution Office (PDO) directed these efforts. Dispatch ordered fuel, monitored the inventory and planned pumping schedules. Pump station operators communicated with dispatch through two-way teletype. Hourly reports were sent to headquarters from every pump station, 24-hours a day. These reports detailed tank gauge readings, barrels received, pressure levels, air temperatures and tank farm inventories. All this information was needed to work out the day's operating guidelines.

Many variables had to be considered when creating the pumping schedules to ensure the timely delivery of fuel. As the pipeline's operating manual stated, "One of the biggest problems of the dispatcher will be to get the right product, to the right place, at the right time."[69] Use of four different products had to be predicted well in advance of the tanker deliveries and be coordinated with available storage space in tanks at Haines, Tok, Fairbanks, Eielson and Fort Greely. Another factor to consider was that it took 11 to 18 days for fuel to move the 626 miles from Haines to Fairbanks. Also, the pipeline had to be packed with fuel at all times, even when Fairbanks was not receiving product. The entire pipeline had a 210,000-barrel capacity. Finally, pumping fuel in large batches was desirable to limit the number of product interfaces. All these factors were carefully considered when ordering fuel and making the batch schedules.

Dispatchers monitored the pipeline at a manually operated control board. The pipeline was represented by a paper tape scaled to 1/8 inch equaling 100 barrels of product. "The paper tape was used to plot the displacement of the products in the line by batches, corrected to all operating variables including time of entry into the line and specific gravity of the product. At hourly intervals this color-coded tape was manually advanced in the direction of product flow a distance equal to the net quantity of product pumped into the line."[70]

HEADQUARTERS TRANSFER

The Haines-Fairbanks Pipeline headquarters were originally located at Haines. In 1956 the Army decided to move administrative control of the pipeline to Fort Richardson. The Haines Business Council caught wind of the plan and organized to protest the move. The Council sent a letter to the President of the United States and Alaska's Governor, Frank Heintzleman. The letter argued that the move was unnecessary, likely to increase operating costs of the pipeline, and not in the best interests of Haines residents. They stated: "It is believed that this move is being sparked entirely in military circles with only personal interest and conveniences in mind and not the interests of the government. If it is a question of housing and conveniences of living, we would like to point out that living conditions in Haines are comparable to those in any Alaskan town."

Governor Heintzleman took the issue to heart and promised to lend support against the headquarters transfer. Heintzleman sent the Army an inquiry about the justification for the proposed move. The Army replied with a letter, signed by the Colonel Keith H. Ewbank, detailing the reasons for the headquarters relocation. The Army cited the need for centralized control of all military fuel distribution operations in Alaska. Besides the Haines Fairbanks Pipeline the military was supervising railroad tank car transport from Seward and Whittier to locations throughout the territory. The Army further stated that the move would "result in a more efficient and economical petroleum distribution system."

According to Haines Terminal foreman, Ray Carder, pipeline employees were not overly concerned by the move. They realized there was little office space at the Haines Terminal and that the Army needed to consolidate control of their fuel distribution. The Army letter resolved the issue and the headquarters were transferred in September of 1956.

[68] U.S. Army Corps of Engineers Alaska District. *Product Pipeline, Haines to Fairbanks Alaska, Operating Manual*. Prepared by the Fluor Corp., Ltd. Los Angeles California.

[69] Ibid. p. 23.

[70] Garfield, D.E., Ashline, C.E., Haynes, F.D., Ueda, H.T. *Haines-Fairbanks Pipeline: Design, Construction and Operation*. CRREL, Special Report 77-4, February 1977. p.11.

5.7 Interface Control

The Haines-Fairbanks Pipeline transported four different products. For example, a batch of diesel fuel pumped through the pipeline was followed and pushed by a batch of jet fuel. This was done without physical separation of the two fuels. Mixing of the products, otherwise known as fuel interface, was kept to a minimum by pressurizing the pipeline. Even when pumping was stopped, the line was kept tightly packed with fuel and pressure was maintained to prevent mixing.

The mixing that occurred was predictable, testable and controlled. Mixture occurred because the products had different specific gravities. The mixture rate then depended on the gravity difference of the products, velocity and pipe diameter. Heavier products tended to go to the bottom of the pipeline and the lighter product was forced to the top.

Fuel interface was the most important factor for pipeline operators to control. Without careful monitoring and testing, contaminated products could cause engine failures. It was particularly important in jet and aviation fuel, where a stalled engine could cause a plane crash. Table 3 shows the amount of product that could be safely mixed with each fuel type.

Table 3. Permissible fuel contamination levels.

PERCENT ALLOWABLE CONTAMINATION OF ONE PRODUCT WITH ANOTHER

(Assumed in Tankage)

Contaminant	AvGas	MoGas	Jet	Diesel
Av Gas	100%	10%	0%	0%
Mo Gas	0%	100%	2%	0%
Jet	0%	0%	100%	5%
Diesel	0%	0%	0%	100%

Machines that measured the specific gravity of fuel, called gravitometers, were installed at every pump station. The gravitometers provided a continuous gravity reading on the product flowing through the line. Since each fuel type had a different specific gravity, it was possible to determine where in the pipeline the fuel interface was located. Gravitometer checks worked best when the specific gravity of two fuels next to each other was not too similar. There was, therefore, a preferred pumping sequence for the products.

Tok Terminal employee Earnest Kelly recalls managing the fuel interface:

> The gravity starts to change when it gets close to this interface, so you know you're close to it. Then it changes clear over to where it says pure gravity for this fuel that's pushing the other fuel. You open a valve real fast and that pure fuel then starts going up on the hill to your storage tanks. And that little interface is opened to a slop tank. And it goes in a slop tank and then it's closed off. Just a few barrels go to this slop tank.[71]

Fuel could also be monitored visually by color. Automotive fuel was red, aviation fuel was green or purple and diesel was a pale straw color. The mixing of the fuels would create a noticeably different color.

5.8 Temperature Issues

The Haines-Fairbanks Pipeline was exposed to extreme temperature variations ranging from a low of –83°F to a high of 92°F. Fuel expands in the heat and contracts in

[71] Earnest Kelly, interviewed by Kristy Hollinger, 11 April 2002. p. 27.

the cold. Expansion or contraction of the product affected the fuel volume and amount of pressure required to pump the product. Cold temperatures also increased the viscosity (resistance to flow) of the fuel. As the operating manual stated:

> The expansion and contraction of product in the line is so great that on a temperature rise it is possible to be receiving product at the north end of the line without any pumps operating. The converse is also true that on a temperature drop, and with the pumps operating, no product will be delivered at the north end, the pumped product being used to repack the line. The operator will have to observe continuously the temperature and pressure conditions all along the line.[72]

Pumping operations were not the only thing affected by extreme temperatures. Fuel levels in the storage tanks were affected as well. The tanks were painted white to reflect heat. Even so, Frank Haas recalled:

> The initial boiling point on some of those products were as low as eight-six degrees Fahrenheit. So on a hot day, you could go out by the tanks and you could watch, you could actually see the vapors coming boiling off the tanks and just like a waterfall coming down the side of the tank. They were dense enough, that they actually obliterated or blocked the sunlight enough to create a shadow.[73]

Most of the fuel transported through the Haines-Fairbanks Pipeline had a very low freezing point. Diesel was the only product occasionally affected by the cold. During some particularly bad weather at Tok, temperatures reached minus 70. According to operators, diesel came out of the pipe looking like Jell-O.[74] After that experience, dispatch tried not to pump diesel fuel during extremely cold weather.

Figure 27. Vern McConnell at the Fairbanks Terminal. Courtesy Vern McConnell.

5.9 Fuel Delivered: Fairbanks Terminal, Eielson Air Force Base and Fort Greely

The Haines-Fairbanks Pipeline delivered fuel to Ladd AFB, Eielson AFB and Fort Greely. By 1961 Ladd AFB was transferred to the Army and renamed Fort Jonathan Wainwright. All three bases had tank farms for fuel storage. Fuel was also delivered to a storage area at Birch Lake. Eielson AFB, Fort Greely and Birch Lake were supplied by taking cuts from batches of fuel passing on the way north.

The Fairbanks Terminal was different from the other pump stations because personnel had direct, day-to-day contact with the military and

[72] U.S. Army Corps of Engineers Alaska District. *Product Pipeline, Haines to Fairbanks Alaska, Operating Manual.* Prepared by the Fluor Corp., Ltd. Los Angeles California.

[73] Frank Haas, interviewed by Pam Moore, tape #92.210.01, transcribed by KM, April 1999. On file at the Sheldon Museum Archives, Haines, Alaska. p. 9.

[74] Ibid. p. 23.

1967 CHENA RIVER FLOOD

In the summer of 1967, the worst disaster in Fairbanks history occurred when the Chena River flooded. The city was inundated with water and 7,000 residents were displaced. Fort Wainwright was equally affected. Fortunately, the pipeline was not damaged and pumping operations continued without serious interruption. Small vehicle fuel distribution points were out of commission though, and a temporary refueling station had to be set up on Gaffney Road. Also, Fort Wainwright at that time had an outdoor storage area for drummed fuel stock. The drums were carried away by the flood waters and had to be recovered with a wrecker. Most of the barrels were eventually located and returned.

The Fairbanks Terminal foreman, Vern McConnell, received a meritorious civilian's award for "service to the Fairbanks Terminal during the flood, which resulted in severe damage to his personal property which would have been avoided had he not stayed on to work his job for nearly three straight days."

Figure 28. Fuel drum recovery on Fort Wainwright. Courtesy Vern McConnell.

the terminal served as a base for the four or five tank gaugers working at Eielson Air Force Base. Also, Fairbanks had fuel distribution officers. Distribution officers transferred fuel to holding tanks, tanker trucks and railroad tank cars for use around the base. Finally, there was no station housing at Fairbanks. Pipeline employees lived in town.

The Fairbanks Terminal was equipped with pumps to push fuel south to Eielson AFB when necessary. The terminal had a lab for final checks on the quality of the fuel inventory. The lab was mostly staffed with military personnel.

The Fairbanks tank farm on Birch Hill was built in 1943 to store fuel arriving from the CANOL Pipeline. The tanks were a portable, bolted steel type, set up for permanent use in W.W.II. As George Lyle explained, "You could take them apart in sections and haul them on a flatbed truck and then bolt them back together when you got to the new location. But they set them up as permanent tanks and so they went inside and they welded a channel over all those bolt heads on the insides so it was more or less a welded tank after that."[75] These older tanks were sometimes a problem in cold temperatures. Welds occasionally cracked when the fuel level was low and the tank would leak a small amount of fuel.

Starting in 1961 the Fairbanks Terminal took on the job of getting fuel to Nenana, which was a distribution point for supplying fuel to the White Alice and DEW Line sites. Fuel was loaded onto railroad tank cars in Fairbanks for the short journey south to Nenana. There the fuel was transferred to barges and floated to the Yukon River. The barges delivered fuel to an airfield at Galena and other points along the river. From the airfield, fuel was flown to sites as needed.[76]

[75] George Lyle, interviewed by Kristy Hollinger. 12 July 2002. p. 10.
[76] Personal communication with George Lyle. October 2002.

Figure 29. Aerial view of Fairbanks Terminal. University of Alaska Anchorage: Consortium Library Manuscripts & Archives Dept. U.S. Army Haines Fairbanks-Pipeline Records 1954–1958.

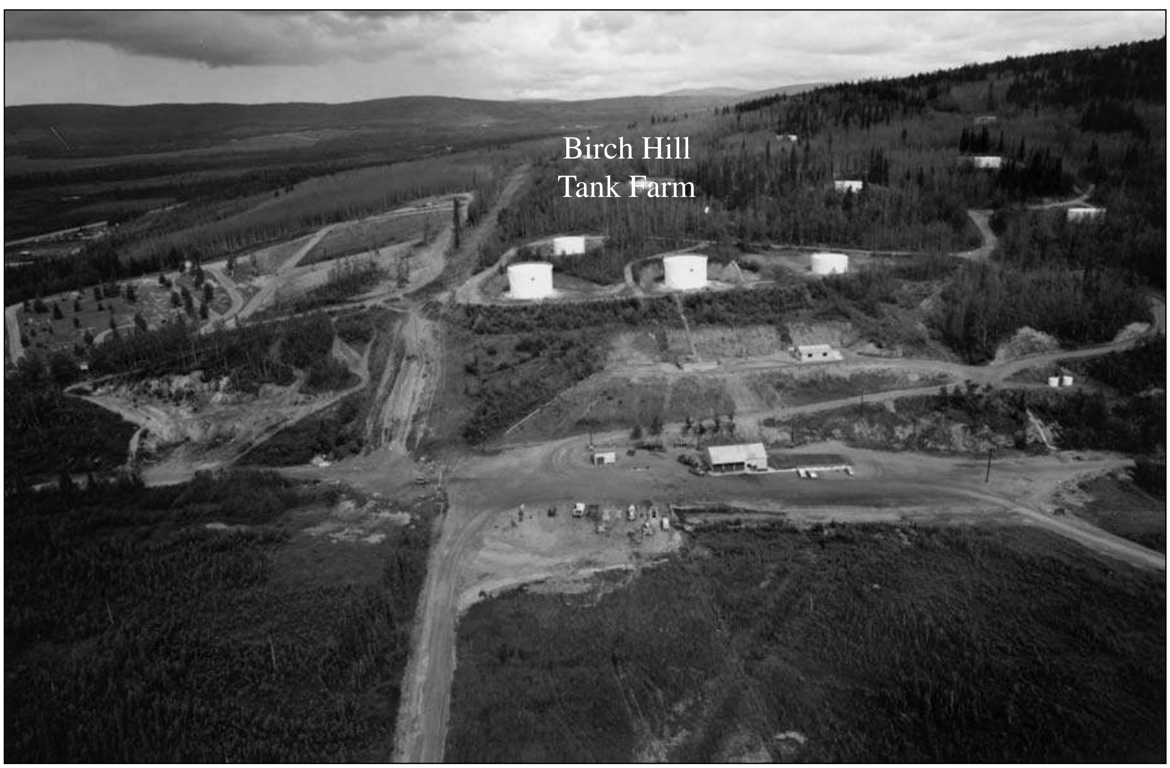


Figure 30. Fairbanks Terminal. NARA.

PRANKS

Operating the pipeline wasn't all work as Frank Haas recalled:

"….some of the pranks that were played, one that I always loved, they had a new dispatcher. Now he was up in Anchorage, and he's connected by teletype and by P.O.L. phone. But he didn't know the ins and outs of the system…And they decided to do a little hufurah on this new dispatcher. So they called each other on the local telephone system and set this up. And then Thompson came on the line with the teletype. 'Attention dispatch, Haines station, ready to go on line with paint tender number blah, blah, blah.' A tender was a shipment of fuel. But this was a paint tender. Then the fellow up at 48-mile came on the line, "48-mile ready to receive tender such and such of paint." And this guy is going nuts. Now this is like two in the morning. So, you know, you don't want to call your boss at two o'clock in the morning. Well, he got on the P.O.L. phone and he called. And he said, "Thompson, what's this about the paint tender?" Thompson says, "I got it right here on my dispatch log. I'm supposed to start pumping about two o'clock in the morning with this, this paint" And then Buskirk picked up the phone and he says, 'Yeah" he says 'Hey, listen dispatcher." He says, "It's on my log too.' He says, 'We're supposed to receive 5,000 barrels of yellow paint.' This guy, as I said, this dispatch was as green as grass, and they had him going. And he was finally going to call the Chief Dispatcher. At two o'clock in the morning, he would not have been a happy man, really and truthfully. We always had things like that going on."

— Excerpted from Frank Haas interview.

5.10 Routine Operations

A team of workers supported pipeline operations. These included maintenance crews, supply specialists, electricians, mechanics, welders, pump operators, fuel gaugers, lab technicians and fuel distribution officers. The number of employees fluctuated over the years as military fuel needs changed. During peak operations, up to 280 people were employed at the stations.[77] Another 30 to 40 people supported pipeline operations at the Fort Richardson headquarters Petroleum Distribution Office in Building 724. The pump stations were staffed 24 hours a day, seven days a week. Employees worked on rotating shift schedules. There were three eight-hour shifts at Tok and Haines: 8:00 am to 5:00 pm, 5:00 pm to 12:00 am and 12:00 am to 8:00 am. The shift schedule changes varied according to pump station, but staff could rotate shifts as often as every week. A foreman was in charge of each station and he reported to the officer in charge at the Fort Richardson headquarters.

Two jobs central to pipeline functions were pump operator and tank gauger. Pump operators were based in the mainline pump building office. They managed pumping duties in conjunction with orders received from the headquarters dispatch office at Fort Richardson. Pump operators monitored the pumps and the diesel engines that ran the pumps. They tracked the fuel interface with gravitometers and took samples of fuel to double check the gravitometer accuracy. Pump operators kept detailed, hourly records of the pumping pressure, barrels received, tank gauge levels and air temperatures, and they relayed this information to the dispatch office via teletype. Operators also frequently assisted with other station work such as building and equipment maintenance.

Tank gaugers controlled fuel storage. They worked in the manifold building and the tank farms. Gaugers operated the manifold equipment to control fuel flow to and from the storage tanks. They also manually checked the fuel levels in the tanks and recalibrated this information to account for temperature influence on the fuel level. Gaugers operated the swing lines that filled and drained fuel from the tanks. Gaugers were also involved in routine station maintenance and tank cleaning operations.

[77] First Report, *Alaskan Command Natural Resource Information Exchange*. 11 Jan 1971. On file at UAA Archives & Manuscripts Dept, U.S. Army Haines-Fairbanks Pipeline collection.

5.11 Maintenance

Besides the day-to-day pumping functions of the pipeline, there was also regular maintenance work taking place. Maintenance was an ongoing concern to prevent problems before they occurred. Potential environmental impacts, the loss of product, and scheduling delays were to be avoided if at all possible.

There were four main areas of maintenance: station, pipeline and right-of-way repairs and tank cleaning. Station work involved repairing and painting buildings and equipment, and cleaning and oiling machinery. As Ray Carder said, "You kept the place spick and span. You could eat off the floor."[78] During the first years of pipeline operations the staff was still limited, so everyone helped out with these jobs. Gradually full-time maintenance crews were added to the team. They were stationed at the Tok and Haines terminals.

Maintaining the pipeline right-of-way was critical to the smooth operation of the system. The majority of the line was surface laid and flash floods occasionally washed out the soil supporting the pipeline. Or the permafrost underneath the pipe might collapse, leaving the line hanging in the air. The soil had to be carefully replaced without damaging the pipe.

Controlling vegetation encroachment along the corridor was the other big issue. The right-of-way needed to be kept clear of trees and brush so repair crews had easy access to the pipeline. Vegetation could also compromise the pipeline metal and had to be cleared often before it grew out of control. Brush control work occurred in winter and summer. In the winter, the frozen ground sometimes facilitated easier removal of vegetation. Cats on both sides of the pipeline plowed brush and snow to the right-of-way edges. To prevent the tractors from running over the pipeline that was under the winter's snow, a man walked the corridor in snowshoes and located the pipe with a rod. For several years, starting in 1968, chemical defoliants were used to control vegetation growth. The defoliants were sprayed aerially. (See Chapter 9 for more information.)

Pipeline repairs involved welding failing seams, replacing valves, and cleaning valve boxes. Fixing holes caused by corrosion or bullet holes required replacing sections of pipe or welding patches to the breaks.

Cleaning the fuel storage tanks periodically was necessary so that the water settling in the tank bottoms did not rust the tank. The slow buildup of sediment in the tank bottoms could also compromise fuel purity. Tank cleaning was a hazardous operation and required strict safety precautions. Tanks at Fairbanks, Fort Greely, Tok, Haines and Eielson were cleaned every three to five years. Pipeline tank guagers and maintenance personnel were usually recruited for the work.

Tank cleaning began with the removal of all fuel. Even when all visible traces of fuel were eliminated, there were still residual toxic fumes in the tank. The tanks were covered, so it was almost pitch black inside and there was no air ventilation. Personnel in protective suits entered the tanks from a side door, known as the "dead man's hatch." Lighting equipment was brought inside with the workers. Initially, fans were used to blow fresh air inside the tanks during cleaning. Later Ventura air movers were used to draw out the fumes. Personnel were connected to fresh air

[78] Ray Carder interviewed by Kristy Hollinger. 8 April 2002. p. 3.

equipment. Sediment was shoveled, swept and mopped up, and then the tank was pressure washed with water and detergent. Sometimes the tank bottoms were sprayed with a tar coating to seal the bottom and protect it from rusting. After the cleaning operation, the tanks were mopped dry and resealed. Sludge removed from the tanks was usually put in barrels and buried near the tank.[79]

5.12 Safety

Fuel is a highly volatile product with explosive potential. Fire was a very serious concern at the tank farms, and each tank was hooked to a central foam fire protection system. Fortunately there was never a fire at the tank farms, and the fire foam system was not used. Pipeline employees observed strict safety precautions. Absolutely no smoking was permitted in the pump stations or tank farms. Lighters and matches were not allowed in working areas and nylon clothing was prohibited since it is spark conducive.

Special tools were provided to prevent sparks from igniting fumes, but as one employee remembered, the tools did not work very well:

> They had what they called safety non-spark tools, which was beryllium. And everybody called them rubber wrenches because if you put a good strain on them they would strain and break and somebody would get hurt. So they said the best way to do those, you take and drill a hole in each one, put a display board on a wall, bolt them to a wall so nobody can get them off – say "There's your safety tools up there, but don't use them."[80]

Pipeline maintenance was also potentially hazardous. John Koehler worked on maintenance crews at Haines and Tok from 1955 to 1970. He remembers visiting every pump station from Haines to Fairbanks and walking almost the entire pipeline at one time or another. He said,

> I tried my best to be careful and not get any of the other fellas burned up. It was dangerous. With welding on the pipe, there's residue inside the pipe. You put heat to it and fumes come and you never know if there's an explosive mixture there or not. If there are a certain percentage of fumes, it will blow, it's explosive. It'll tear things apart.[81]

Daily routine exposure to volatile products could be taxing, particularly when combined with Alaska's treacherous weather. The working conditions for fuel distribution officers were explained in a job description:

> Approximately 50% of work is performed outside where winter temperatures to -70∀F and summer temperatures to +90∀F are encountered. Inside work is in well heated and ventilated buildings. Subject to fumes peculiar to petroleum products, to injury from climbing about large storage tanks and tank cars under snow and

[79] Harding Lawson Association, Engineering and Environmental Services. "Work Plan: Fuel Terminal Investigation: Haines, AK." HLA Project No. 20801. 10 Nov. 1992.
[80] George Lyle, interviewed by Kristy Hollinger. 12 July 2002. p. 7.
[81] John Koehler, interviewed by Kristy Hollinger. 10 April 2002. p. 2.

ice conditions, and to danger of explosions or fires of highly volatile petroleum products handled.[82]

5.13 Security

Pipeline security was an important issue because fuel distribution was a vital link to the defense missions of interior Alaska, especially for the Air Force. Interrupting the flow of fuel could directly affect the military's ability to function. This, combined with volatile nature of fuel and the large quantities being transported and stored, made it essential that no one inadvertently or purposefully damaged the pipeline or pump stations. The pump stations were posted with signs warning against trespass. All were fenced off with gate-controlled admittance. Employees kept in close contact with local authorities. Security generally "came down to individual vigilance."[83] As an added precaution, employees were subject to background checks before they were hired.

Security breeches at the pump stations were rare according to former employees. Vern McConnell recalled one incident when someone wrote an explosive chemical formula on the side of a tank. Guards were temporarily stationed at the terminal to protect the facilities.

5.13.1 Aerial Surveillance

Pipeline security was also maintained by weekly aerial surveillance flights. The pilot inspected the pipeline for sabotage and right-of-way encroachments. The flights were also used to scout pipeline leaks that were too small to show up on the pump station pressure gauges.

Figure 31. Pipeline marker for aerial surveillance. From collection of USARAK.

A civilian contractor conducted the surveillance flights.[84] The pilot had a special permit from the Federal Aviation Administration to fly 200 feet or lower. The pilot was based in Haines and flew to Tok one week and to Fairbanks the next. The flight to Tok took four hours each way and the Fairbanks trip took about six and a half hours. The flights included a fuel stop in Northway. The journey usually required an overnight stay somewhere along the line, except during the summer when extended daylight hours might enable the pilot to complete a trip before sunset. Overnight stays were kept to a minimum because the contractor had to pay for his own room and board.

Layton Bennett won the surveillance contracts for all but two years between 1958 and 1974. In the 14 years that he flew the pipeline, Bennett failed to complete the

[82] Department of the Army, Job Description, Fort Richardson, Alaska. Job No. 6984a, Fuel Distribution System Operator, Grade 11, OCC Code 5413, 13 Feb. 1963. Courtesy of George Lyle.

[83] Thomas Webster, interviewed by Kristy Hollinger. 29 October 2002. p. 13.

[84] Others sources state that the Army conducted pipeline surveillance with Huey helicopters in 1971, 1972 and 1973. The frequency and extent of this surveillance is unknown.
(http://www.t-6.com/Twelfthaviation/Support/History.html)

weekly trip just twice. He always pushed to finish the job because he was only paid for completed missions. The most common problem Bennett identified on the flights was that of people working close to the right-of-way with heavy equipment. Stopping people before they tried to cross the pipe with their tractors was extremely helpful in preventing pipeline damage. When Bennett saw someone working too close to the pipe, he radioed the location to the nearest pump station and a man was sent out to warn the person against crossing the line. The line locations were identified by large yellow milepost markers placed every mile along the route.

During his first few years on the job, Bennett's biggest problem was making the trip through Canada without stopping for fuel. Landing in Canada meant the Mounties had to drive to the airport to clear Bennett through customs. This caused a lengthy delay and quickly upped the cost of the trip and decreased the profit for Bennett. The flights were made year-round, and Bennett never canceled trips due to cold weather or poor conditions. He had occasional forced landings, but only two incidents caused minor damage to the plane.

The pipeline route mostly traversed unpopulated areas. Forced landings were made on the highway, which was not as busy as it is today. Weather in southeast Alaska can be treacherous. Bennett said he stayed safe during his long flying career by setting limits that he did not cross – no matter what. "I never push beyond a certain point," he said. "You have to give yourself that leeway. And you know somebody else goes through and he might make it, but you're doing this EVERY DAY. You've got to make it every time, not just a dozen times. And that's what brought me through. I always had this minimum." Despite the occasional danger Bennett said the flights were "just plain fun" and "exciting."[85]

[85] Layton Bennett, interview with Kristy Hollinger.

Chapter 6.0 System Expansions: 1961

Military fuel needs increased significantly in 1961, six years after the pipeline was built. Fortunately, growing fuel needs were anticipated when the pipeline was designed and allowed for relatively easy modifications to expand the system.

Six new pump stations were needed to boost pressure and move fuel through the pipeline at a faster rate. The new stations, from south to north, were: Blanchard River, Destruction Bay, Beaver Creek, Lakeview, Sears Creek and Timber. Three of the stations were in Canada and three were in the United States.

The United States asked Canada on April 19, 1962, to amend the June 30, 1953 Haines-Fairbanks Pipeline agreement to allow construction of the new stations. It was suggested that the same terms and conditions authorized in the original agreement be employed. In particular, Canadian supplies and labor were to be used in the construction and operation of the new stations. The Canadian Secretary of State for External Affairs approved the request on April 19, 1962.[86]

Figure 32. Destruction Bay under construction. NARA.

A $1,609,713 contract was awarded to Premier - H & K Construction Co. of Portland, Oregon, for the three Alaskan stations. Yukon Construction Co. of Edmonton had the $1,396,858 contract for Canadian work. Six 50-foot trailers were provided at each station for worker housing. The main concern was ensuring that all work was completed on time. Construction was carried out simultaneously at all sites. Delay at one station could hold up the entire project. Fort Greely's resident engineer at the time, Carl Eilertson, consulted with the Alaskan crews to make sure the schedule was adhered to. Eilerston's assistant, Ellis Morgan, took charge of the Canadian construction sites. He put in 1,200 to 1,500 miles a week traveling back and forth to the sites. Contractors had approximately six months to complete the job.[87]

The six new stations were nearly identical in design, with the exception of Blanchard River. Blanchard River was to have three pumps while the other stations would have two. The extra pump meant the composite building had to be larger and more fuel was required to keep the station running.

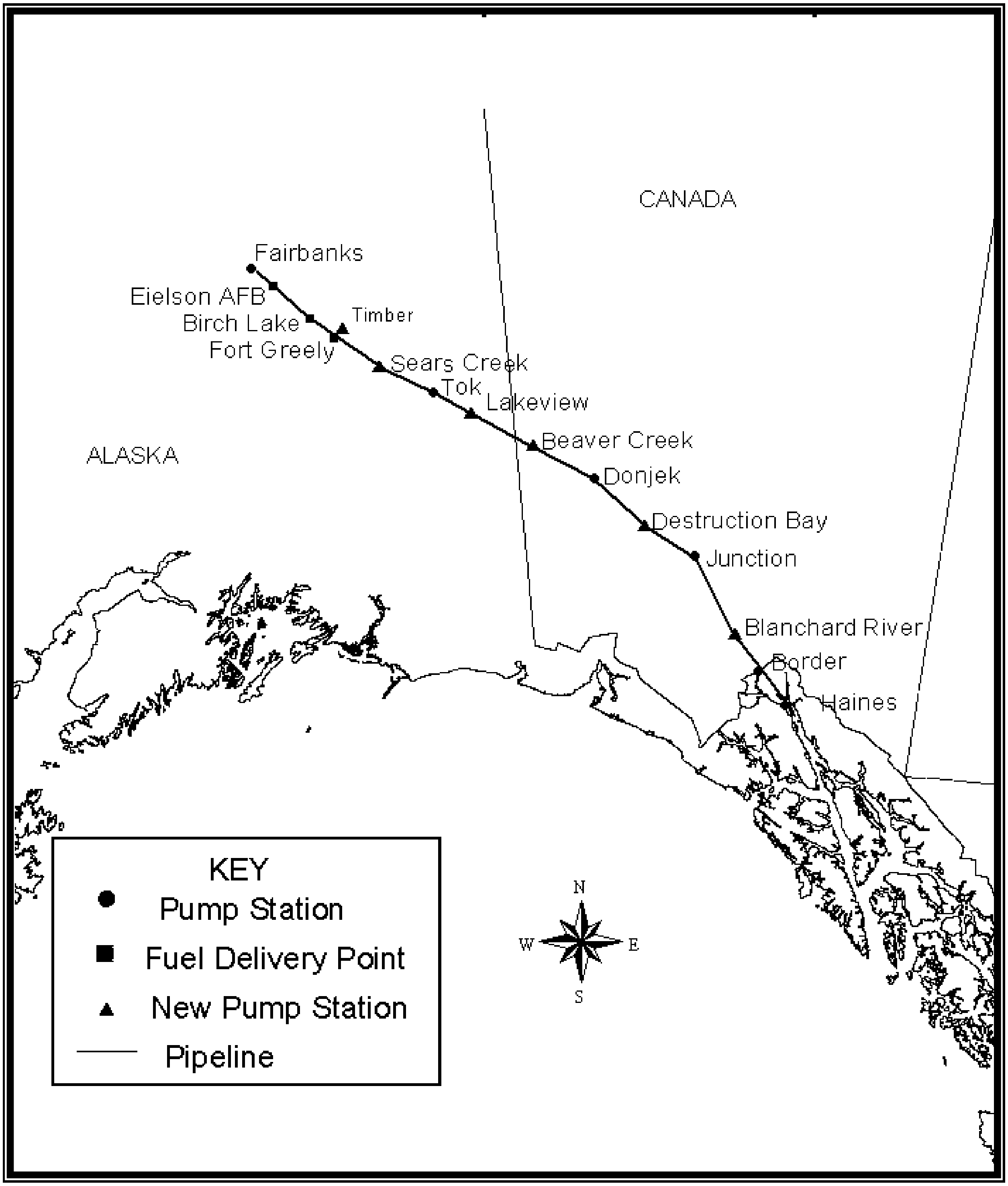
The addition of the six pump stations nearly doubled maximum daily fuel outputs. Previously, operating at the highest pumping capacity put 16,500 barrels a day through the system. This was increased to 27,500 barrels a day. According to former

[86] Department of External Affairs Canada, Note No. 63, Ottawa, April 19, 1962.
[87] Ross, F.K. "Alaska Pipeline Face-Lifting." *Pacific Builder and Engineer*. Vol. 68, No. 9. 1962. pp. 82-83.

employees, the new booster stations were only used to full capacity for several years before military fuel needs decreased again. The stations were put on caretaker status with fewer operating personnel. They were used intermittently when fuel needs escalated.

Figure 33. Blanchard River Pump Station. NARA.

Figure 34. Destruction Bay Pump Station. NARA.



Map 3. Haines-Fairbanks Pipeline: New Pump Stations, 1961–1973.

CHAPTER 7.0 Pipeline Life

Since the majority of the Haines-Fairbanks Pipeline was in remote rural areas, housing was provided on site for pipeline employees and their families. Life at a pump station is an interesting and unique part of the pipeline story. The stations were self-contained communities and as the Tok Terminal foreman described it, "Operating Tok was the same as operating a little city. You had everything. You generated your own power, you made your own heat. You were you own policeman and dog-catcher."[88] The following chapter looks at the lives of employees and family members at the Haines and Tok Terminals. Haines and Tok had the most employees because, in addition to pumping operations, they were also receiving and storing fuel. It was difficult to track down people from the smaller booster stations to record their memories for this document.

7.1 Haines Terminal

Employees at the Haines Terminal lived in town or on the station site. Most people referred to the station as the "tank farm." There were two housing complexes with 16 apartments, located between the tank farm and pumping area. One complex had eight three-bedroom apartments and one had eight two-bedroom apartments. They were two-story units with wood flooring, a kitchen, bathroom, living room and full basement. Former residents recall that the apartments were quite pleasant. There were also bachelor's quarters – more commonly known as the BOQ (Bachelor Officer Quarters). The BOQ had space for ten men and included a dining room, kitchen, living room, shower room and two toilets.

Figure 35. Bill Kelm in back of Haines apartments. Ca. 1959/60. Courtesy Jeannette Menaker.

The housing complex was fenced off from the tank farm and pumping area. The fencing was for the residents' safety and security. Family members rarely ventured into the terminal's working areas. Children could grow up at the station without ever going into the tank farm.

There was a concrete freezer building in front of the apartments, which everyone shared. To save money, families teamed up and ordered groceries wholesale from Seattle. Alaska Steam Ship delivered the food twice a year. Basics such as lemons, apples, oranges and eggs were purchased in bulk.

Haines was unique among the pump stations because it was in a community of around 1,000

[88] Johnny Burnham, interviewed by Kristy Hollinger. 7 May 2002. p 7.

Figure 36. Byrd Kelley at the Haines Terminal front gate, ca. 1957. Courtesy Jeannette Menaker.

Figure 37. Jeanette, Joyce & Douglas Kelley in the dining room at their Haines Terminal apartment. Courtesy Jeanette (Kelley) Menaker.

people. Pipeline families had more recreational and social opportunities. At other stations families were limited to socializing with each other.

One-half to one-third of the Haines Terminal employees did not live in station housing. Yet even those living in town frequently maintained close ties with other pipeline families. There were holiday parties in the BOQ and the women often met for coffee klatches. June Haas remembers, "We had fun, and most of the people at the tank farm were friends. In town we used to go out to the Chilkat Lake when it really froze well and we'd have a fire out there and some of the guys would fix up a generator so we could have lights and music and cook moose steaks."[89]

The Haines Terminal was three and a half miles from the town center. During peak operations there were about 26 children living at the station. A school bus drove to the terminal to take them to school. Jeannette Menaker recalled that they never missed a day of school because of deep snow – a plow drove to the terminal especially to clear the road for their bus.

The arrival of tankers was always a special occasion. Joyce Thomas recalls, "That was a big time out at the tank farm when those ships came in. We would all go out and watch it dock. It was the entertainment."[90]

The Haines-Fairbanks Pipeline was a tool of the Cold War. It was thought that the facilities would be a second strike target by the Soviets if the war ever turned "hot." Most people interviewed did not think they were in danger by living in close proximity to the pipeline. Attack was, however, considered in the design of the project. All apartments had full basements that also served as air raid shelters.

There were pros and cons to living at the station. Living on site eliminated a commute, of course. Since employees were working shift schedules around the clock, it was a nice to have a short walk home at the end of the night. The

[89] June Haas, interviewed by Kristy Hollinger. 12 April 2002. p.7.
[90] Joyce Thomas and Jeannette Menaker, interviewed by Kristy Hollinger, 10 April 2002. p. 6.

Figure 38. Residents had gardens at the station. Here Betty Kelley sits on her front porch with prize turnips. Courtesy Jeanette Menaker.

housing was pleasant, and the rent was affordable. On the reverse side, living and working in the same place with the same people could be overwhelming. And because some men worked through the night, they were trying to sleep during the day. Keeping the noise down was an issue.

7.2 Tok Terminal

The Tok Terminal housing complex originally had 12 apartments in two buildings. One building had four three-bedroom units and the other had eight two-bedroom units. There was also a BOQ which accommodated ten men. Unlike at Haines, most of the Tok Terminal employees lived in station housing. As at Haines, the housing complex was enclosed in a fence for security and safety.

Tok was a very small community and there were few houses available to buy or rent. As more employees were hired, the station apartments quickly filled up. Trailer homes were purchased to accommodate new families. They were used for about five years before more station housing was built.

While the station apartments were pleasant, everyone described trailer living as a miserable experience. The walls were only two inches thick and the heating system was totally inadequate. Anything that touched the sides of the trailer in winter, such as bedding or clothes hanging in the closets, would freeze to the walls. As John Koehler said of the trailers, "you could exist in them but they weren't too warm."[91]

Tok was established as an Alaska Road Commission Camp during construction of the ALCAN and Glenn highways from 1942 to 1946. The 1960 Census recorded a population of 129 people, with another 186 people living nearby in "unspecified" locations.[92] This meant that pipeline employees mostly socialized with each other. Recreational activities available at Tok were mainly hunting and fishing. The BOQ was equipped with a bar for holiday parties. Movies were a popular diversion. The pump stations were on the Army movie circuit for many years, and a film was shown in the BOQ five times a week.

Some residents got cabin fever in the winter, finding the living conditions too stressful. As Johnny Burnham recalled, "Some people didn't stay over a year. One winter

[91] John Koehler, interviewed by Kristy Hollinger. 10 April 2002. p. 4.

[92] *Socioeconomic Community profiles: A Background for Planning. Delta Junction, Dot Lake, Norhtway, Tanacross, Tetlin, Tok.* Northwest Alaskan Pipeline Company, 1980.

would be enough. And then there was others that it didn't seem to bother." Burnham combated the winter blues with physical activity. He became an avid trapper.

Until the mid-1960s, Tok pipeline employees had commissary privileges at Fort Greely. Most families took advantage of the option and drove to Big Delta once a month to stock up. After commissary privileges were revoked in the mid-1960s, residents drove to Anchorage or Fairbanks to buy food.

There was a small school in Tok that served students in grades one through eight. In the mid- 1950s, the school had seven pupils and one teacher. Carly Hanson, pump operator Dwight Hanson's wife, drove the children to school. As the pump station grew, there were about 52 children living at the terminal and a bus was purchased for them. In 1958 a high school was built in Tok. Before 1958 some employees were forced to transfer to another station so their children could have access to education. The Hansons moved to the Fairbanks Terminal when their children reached high school age.[93]

7.3 Booster Stations

Living at the smaller pump stations was quite different than living at Tok or Haines. Most of the booster stations were in isolated, remote areas. The stations had a maximum of about six employees. The six pump stations added to the pipeline in 1961 were architecturally distinct from the original five stations. Instead of apartment housing there were detached 10' x 50', two- bedroom trailers for the station employees and some dorm-type accommodations. According to Richard Duke, who worked at the Lakeview Station, the trailers were not particularly nice. The windows were positioned so high that one had to stand to see outside.[94]

Often the smaller pump station residents had limited education access for their children. In the mid-1950s there were five or six children at the Border Station. They had school lessons with a teacher in the dormitory building. As children grew, families often moved to have access to better education. Residents at these pump stations also had limited access to social activities. Recreation often centered on outdoor pastimes such as hunting, fishing and camping.

Border Station, sometimes known as 48-mile or Rainy Hollow, was not accessible by road during the winter. Station residents kept mobile by airplane. Border experienced heavy snow in the winter months. Elizabeth Karmen remembered the winter of 1956 when "the snow was so high, you wouldn't believe this – we had to go up the upstairs window to look out. And he (Ed Karmen) had to go…change a light bulb in the streets, and …he's on a snow bank and bends down to change the light."[95]

Haines Terminal families often visited Border in the winter for sledding, skiing and curling parties. Ed Karmen flew people to the top of the ski hill in his ski equipped plane. Haines families usually spent the night during these get-togethers. Elizabeth Karmen said, "once a week we'd put on a dinner or supper for the people from Haines that would come up…And we'd feed them…And then somebody else next week would take it over."[96] In the summer Border families visited Haines.

[93] Dwight Hanson and Carley Hanson, interviewed by Kristy Hollinger. 7 May 2002.
[94] Richard Duke, interviewed by Kristy Hollinger. 15 April 2002.
[95] Ed and Elizabeth Karmen, interviewed by Kristy Hollinger. 11 April 2002. p 5.
[96] Ibid. p.7.

7.4 Economic Impact

Approximately 250 employees supported the 626-mile-long Haines-Fairbanks Pipeline during peak operations. The number of employees varied as fuel demands changed. Peak demand occurred in the early 1960s when six pump stations were added to the line. Though the number of workers may seem small overall, the impact they had on nearby communities was important—particularly at Tok and Haines where the largest number of workers were stationed. Jeannie Menaker thought the impact of the pipeline on Haines was significant:

> As far as the impact on the community, I'd say it was huge. It brought in a lot of people from different places with different… ideas. It put a lot of money into the community. Both in the construction…and operation. Then it stayed there as a viable economic entity.[97]

The pipeline pump stations, with the exception of the Fairbanks Terminal, were located in small, remote communities. Some booster stations were in totally unpopulated areas. Haines was the largest town on the pipeline corridor, and even there the addition of between 40 and 50 men with steady, good paying work made an important contribution to the local economy. Many employees were married with children and this increased the population. More goods and services were needed to support the growing community.

The towns further benefited by the provision of 874-money for schools. Since station housing was government owned, occupants were not required to pay property taxes. This 874-money compensated schools for this loss of revenue in accordance with the number of students living at the station. This money was extremely important to local schools and aided in the expansion and maintenance of services.

The pipeline probably affected Tok more than anywhere else along the pipeline corridor. Tok was a small community of 315 in 1960. The presence of pipeline employees played a role in stabilizing the Tok economy. Also, 874-money directly contributed to the construction of a new school in 1958 when the number of children at the station was increasing significantly.

[97] Jeannette Menaker, David Menaker and Joyce Thomas, interviewed by Kristy Hollinger, 10 April 2002. p. 19.

Chapter 8.0 Pipeline Shutdown, 1971–1979

The Haines-Fairbanks Pipeline did not close suddenly, unexpectedly, or even simultaneously. The northern half of the system, from Tok to Fairbanks, operated longer than the southern half. Most former employees interviewed were not surprised by the shutdown. The workforce was gradually reduced in the late 1960s. Many employees retired or transferred to the Whittier-Anchorage Pipeline.

The main driver behind the pipeline closure was the increasing cost of maintenance. Investigations revealed significant corrosion problems on the southern half of the pipeline. In 1968 there were five pipeline leaks attributed to weakened metal. The maximum pumping pressure out of Haines was reduced from 1000 pounds per square inch (psi) to 700 psi. This reduced stress on the pipe but also slowed the flow of fuel. In 1970, a study by the U.S. Army Material Command concluded the Haines-Fairbanks Pipeline was no longer needed—providing more fuel storage tanks were built at Eielson Air Force Base and railroad and tanker truck receiving facilities were upgraded.[98]

The Haines to Tok section of the pipeline was mothballed in July of 1971. Operators were instructed to leave the terminal in such condition that it could be reactivated within 30 days if necessary. Station equipment was carefully inventoried, cleaned and left in the buildings. All fuel was pumped out of the pipeline. Then propanol, water and air were successively displaced through the system to clean residual fuel traces from the pipe. The Army permanently closed the southern section of the pipeline one year later, in the summer of 1972.[99]

Starting in the 1970s, the Birch Lake and Fort Greely fuel tanks were gradually taken out of service and disassembled. The tanks were W.W.II type, bolted steel structures similar to those at Fairbanks. As the tanks aged, the bottoms started corroding and they had to be removed. At Birch Lake the soil under and around the tanks was excavated and replaced.[100]

After the southern half of the pipeline was closed in July of 1971, fuel was delivered from Anchorage to Tok by tanker truck or railroad and pumped north as needed. Then in 1973 the Tok to Eielson section of the pipeline was deactivated. The pipeline was scrubbed clean before it was abandoned. Residual fuel left in the pipe could vaporize and produce a combustible mixture. As Thomas Webster stated, "We couldn't guarantee 100% but we did, we did try to purge it (the pipeline) of all fuel. Scrub it clean and wash it down and try to make it as inert as we could." Only 27 miles of the Haines-Fairbanks Pipeline continued operating, from Fairbanks to Eielson Air Force Base.[101]

Though most of the pipeline was deactivated in 1973, the tank farms at Haines and Tok remained in service. The Cold War demanded strategic fuel reserves in the event of war. The Tok tank farm was used for standby storage until 1979 and Haines

[98] "Alaskan Command History 1970." Prepared by the Historian, Office of the Secretary. Joint Staff Headquarters ALCOM. 71-73.
[99] "Alaskan Command History 1972." Prepared by the Historian Office of the Secretary, Joint Staff, Headquarters ALCOM.
[100] Thomas Webster, interviewed by Kristy Hollinger. 29 October 2002. p.8.
[101] Ibid. p.7.

Figure 39. Example of a 3" pig used in the CANOL Pipeline. Courtesy George Lyle.

was used until 1988. The fuel had to be rotated out of storage every few years so it did not spoil. All the fuel was transported by tanker truck. Rotating such large quantities of fuel was a big job, and as Earnest Kelly stated, "We used to have a hell of a time juggling storage."[102] Thomas Webster said, "Sometimes we were having to haul JP4, for example, from here (Anchorage) to Tok to rotate the product. And that was not only expensive, but we just increased our exposure, our risk. Highway accidents, you know, what-have-you."[103]

In 1979 the Army decided to close the Tok tank farm. The Tok to Fairbanks section of the pipeline was briefly reactivated to pump all remaining fuel out of the station. The Army estimated reopening the line would save $500,000.00 in transportation costs and closing the tank farm would save another $400,900.00 in annual operating costs.[104]

Reactivating the pipeline for this final service necessitated checking for corrosion that may have developed during the five years the line lay dormant. A linalog survey was initiated in 1978. A linalog is an instrumented pig that measures pipe thickness, indicating where weakened metal is located. A pig is a scraper used to clean a pipeline. The linalog was pushed through the pipeline with water. The survey revealed that over 200 sections of pipe needed replacing. After the line was repaired, it was discovered that water had frozen in the pipeline in the Shaw Creek Flats area, north of Fort Greely, during the linalog survey. The pipeline was underground in that location. Repair crews dug up the line and located ice by shooting holes in the pipe with a 30-06 rifle. Patches were welded over the bullet holes. Eventually the line was repaired and all fuel was pumped out of Tok Terminal in July of 1979.[105]

Figure 40. Water shooting out of a bullet hole during pipeline repairs.

Several groups expressed interest in using the pipeline for other purposes as the system was phased out. The Canadian government considered using the line to transport fuel for civilian use in the Yukon. After the Canadians conducted a feasibility study, they concluded the repair and maintenance costs did not justify using the system.[106] There was also talk of using the pipeline to transport natural gas in the opposite direction, from Fairbanks to Haines. A 1979 study explored the possibility

[102] Earnest & Laura Kelly, interviewed by Kristy Hollinger 11 April 2002. p. 26.
[103] Thomas Webster, interviewed by Kristy Hollinger 29 October 2002. p. 6.
[104] Press Release, 78-6-20-94. "Pipeline to Reopen." Public Affairs, 172d Infantry Brigade. Fort Richardson, Alaska. 22 June 1978.
[105] Vern McConnell, interviewed by Kristy Hollinger. 12 July 2002. p. 2,3.
[106] Manders, P. *An Evaluation of the Economics of Utilizing the Haines-Fairbanks Pipeline for Civilian Purposes*. Economic Staff Group, Norther Development Branch, D.I.A.N.D. 29 April 1970.

of using the Haines Terminal for an Alaska Marine Highway base.[107] None of the projects were carried out. As early as 1970, U.S. Army Alaska considered and rejected commercial use of the pipeline "due to the lack of funds for rehabilitation and the possible magnitude of pollution that could occur."[108]

8.1 Impact on the Communities: Haines and Tok

The pipeline was shut down gradually over the years, cushioning the economic impact of the closure on nearby communities. The booster stations in particular only had a couple employees each by 1970. Haines and Tok, the major towns on the pipeline corridor, had the largest staff and therefore would have felt the greatest effects from the shutdown. Operating personnel were slowly cut back in the late 1960s and early 1970s. The tank farms continued to be used until 1979, so some employees were kept on hand for tank maintenance. Tok still had seven employees that final year.

As pipeline operations were winding down in the late 1960s and early 1970s, new industries were emerging in Haines and Tok, moderating the impact of the pipeline shutdown. Tourism was expanding in Tok and helped stabilize the town's economy. The town population increased from 577 people in 1970 to 696 people in 1980.[109] The Bureau of Land Management used the pump station for several years for its Fortymile Resource Area headquarters. The Haines population also remained stable. Tourism and logging expanded, bringing more money and people to the community.

[107] Human-McDowell Associates. "A Study of the Feasibility of Converting the Haines Tank Farm to a Maintenance, Refueling and Watering Facility for the Alaska Marine Highway System." For Legislative Affairs Agency, Research Division. Gregg K. Erickson, Director. Juneau, AK. 30 April 1979.

[108] "Alaskan Command Annual History 1970." Prepared by the Historian, Office of the Secretary, Joint Staff Headquarters ALCOM.

[109] *Socioeconomic Community Profiles, A Background for Planning. Delta Junction, Dot Lake, Norhtway, Tanacross, Tetlin, Tok.* Northwest Alaskan

Chapter 9.0 Environmental Impacts

The Haines-Fairbanks Pipeline operated for a number of years without significant problems. Acidic soil conditions contributed to pipe corrosion, and leaks occasionally developed as the system aged.

From 1955 to 1972 there were 40 recorded spills on the Haines-Fairbanks Pipeline. Twenty-eight of these occurred in 1956 during the line freeze-up when the line was deliberately cut to purge ice from the system. Of the other 12 recorded spills, four were caused by bullet holes, six were from corrosion, one from a vehicle hitting a valve, and one from a power pole auger accidentally punching through the pipeline.

Some of the bullet hole leaks were deliberate attempts to tap the line for fuel. Others may have been unintentional but were the result of a blatant disregard for safety. One incident occurred when someone used the pipeline for a backstop while shooting cans for target practice. John Koehler recalls the power pole accident:

> I remember up around Delta Junction, Harding Lake, where the line was buried. Golden Valley Electric were down there in the winter punching holes to set poles, and in one place they got right on top of the pipe, and they thought they were on a rock. They moved and punched through the pipe! I imagine they got a bath. We repaired where they chewed the pipe up.[110]

The Haines-Fairbanks Pipeline was buried or laid directly on the ground, without any protection from the elements. Lengths of pipe were exposed to different soil and surface conditions that changed seasonally and created the electrical conditions conducive to corrosion. The corrosion problems mostly occurred in the later years of operations as the pipeline metal aged.

The largest pipeline leak prior to 1972 occurred in the Yukon Territory in May of 1968. Acidic soil caused pipe corrosion and 4,000 barrels of diesel fuel leaked from the line. The fuel permeated down a slope into Dezadeash Lake. Cleanup crews set up catch basins to collect fuel flowing down the slope and used straw to soak up the fuel in the lake. The straw was collected and burned. The effects of the spills were studied in 1972. The study concluded that many areas where fuel was spilled were still devoid of vegetation.[111]

Pipeline corrosion control technology was limited when the Haines-Fairbanks Pipeline was designed. Before the invention of linalog technology in the late 1960s, there was no way to inspect for corrosion except by visual survey. Visual inspection of buried pipe was difficult and time-consuming. It required digging a sample of holes to get an idea of the pipe condition. The 1970s' investigations revealed that

[110] John Koehler, interviewed by Kristy Hollinger 10 April 2002. p. 5.

[111] Rickard, W.E. & Deneke, F. (April 1972) *Preliminary Investigations of Petroleum Spillage, Haines-Fairbanks Military Pipeline*, Alaska. Corps of Engineers, U.S. Army: Cold Regions Research and Engineering Laboratory. Hanover, New Hampshire.

much of the pipeline would be subject to corrosion unless protective methods were taken. Wrapping the entire pipeline to insulate it from contact with the ground was too costly. Annual maintenance programs were implemented to identify and repair the highest risk areas.[112]

Besides fuel spills along the pipeline corridor, the pump stations also had an impact on the environment. Fuel and hazardous waste was burned, spilled and buried at these stations. Diesel fuel mixed with chemical defoliants was sprayed on the Tok and Haines tank farms to inhibit vegetation growth. Documentation of the contamination and subsequent restoration work is available at the Department of Public Works, Environmental, U.S. Army Alaska. A full discussion of environmental investigations and cleanup efforts is beyond the scope of this report.

There also was contamination through the aerial spraying of chemical defoliants along the corridor. There is concern that the defoliants polluted vegetation, which was in turn consumed by people or wildlife. There are also two accounts of Klukshu Indian Village residents in Canada being directly hit by the herbicide during the spraying. The village was adjacent to the pipeline right-of-way. A 1994 study by Stan Gray investigated the Klukshu Indian Village's exposure to the defoliants. The author concluded that there were hazardous levels of dioxin contamination in the soil. The long-term, overall effects of the chemical defoliants along the entire corridor are not fully known.[113]

The Haines-Fairbanks Pipeline was built and operated according to the standards of the day. As stated in an investigative report, "Environmental contamination at the site is the result of routine past operations. Waste management practices at that time were typical of those practiced at other military POL facilities."[114]

9.1 Haines-Fairbanks Pipeline and the Trans-Alaska Pipeline

The 1968 discovery of oil in northern Alaska set the stage for the Trans-Alaska Pipeline System (TAPS) that would run 800 miles from Prudhoe Bay to Valdez. Pipeline technology had advanced significantly in the years since the Haines-Fairbanks Pipeline was designed and built. Corrosion control methods in particular had come a long way. The Trans-Alaska Pipeline designers had the opportunity to study 30 years of Alaskan pipeline operations and learn from past mistakes. Vern McConnel recalled, "When they were in the design stage on the Alyeska line they'd talk to us a lot…Yes they were very interested in our operation."[115] Tom Webster remembers that some Haines-Fairbanks Pipeline employees transferred to work for the TAPS operation. No doubt their experience and knowledge contributed to the project. In this way the Haines-Fairbanks Pipeline played some small role in facilitating better managed and designed Alaskan pipelines.

[112] Thomas Webster interviewed by Kristy Hollinger 29 October 2002.

[113] Gray, Stan. "The Spraying of Herbicides and the Testing for Contaminants at the Klukshu Indian Village". Report to Lawrence Joe, Champagne and Aishihik First Nations. March 1994.

[114] Harding Lawson Associates 'Work Plan Fuel Terminal Site Investigation, Haines, Alaska' 10 Nov. 1992. p. 2-9.

[115] Vern McConnell interviewed by Kristy Hollinger. 12 July 2002. p. 7.

Chapter 10.0 Conclusions

The Haines-Fairbanks Pipeline was an important logistical asset during the Cold War. The entire pipeline system operated for 16 years while smaller segments of the line continued working for another eight years. Even after major sections of the pipeline were deactivated, the tank farms at Haines and Tok continued to be used for fuel storage. The 27-mile section of pipeline between Eielson Air Force Base and Fort Wainwright, known as the Fairbanks-Eielson Pipeline, operated until 1992.[116]

In 1961 it was estimated that the Haines-Fairbanks Pipeline saved $5 million in annual shipping costs. Unlike the incredibly expensive CANOL Pipeline, the project paid for construction costs within the first six years of operation.[117] The 1961 construction of six additional pump stations added $6 million to the project's cost. Again, the savings in expedient fuel deliveries balanced the cost.

Pipeline employees had an important job and they made a significant contribution to supporting Alaska's Cold War missions. As Frank Haas said, "They (Fairbanks) always got the fuel when they needed it. So we felt real good about that."[118] Chief of Petroleum, Thomas Webster said of the employees, "There's not a man that I can think of in that group that I wouldn't take my hat off to any time. They were good men."[119] Pipeline employees were paid well, and most said they enjoyed the work. As Johnny Burnham said, "Overall it was a heck of a good job."[120] Conditions could be difficult living in remote, isolated areas and working in extreme weather conditions. The occupational hazards associated with handling volatile petroleum products required that every employee operate to the highest professional standards.

Figure 41. Timber Pump Station, May 2002. From collection of USARAK.

Today the physical remains of the Haines-Fairbanks Pipeline are rapidly disappearing. Though the right-of-way corridor can still be seen in places, most pipe has been removed and salvaged. The pipe in Canada was removed from 1989 to 1991. Part of Tok Terminal was demolished in the summer of 2002 and the demolition should be completed in the summer of 2003. Haines Terminal is also scheduled for demolition in 2003. Environmental restoration work has been occurring at Haines, Tok and Fairbanks since the early 1990s. Some of the other U.S. pump stations are still standing,

[116] This section of the pipeline was subject to major rehabilitation in the 1980s when the pipe was coated to protect against corrosion.

[117] Ross, F.K. "Alaska Pipeline Facelifting" *Pacific Builder and Engineer.* Vol 68 No. 9. 1962.

[118] Frank Haas, interviewed by Pam Moore 29 April 1992. On file at the Sheldon Museum & Cultural Center, Haines. Tape # 92.210.01.

[119] Thomas Webster, interviewed by Kristy Hollinger. 29 October 2002. p. 12.

[120] Johnny Burnham, interviewed by Kristy Hollinger. 7 May 2002. p. 15.

though their condition is deteriorating. These stations are no longer under U.S. Army Alaska control.

The Canadian pump stations were mothballed when the Haines to Tok section of the line was deactivated. When the Tok to Eielson section of the line was closed, the U.S. Army started clean up of the Canadian pump stations. This involved digging up garbage pits and transporting waste back to the United States. Tom Webster said, “We backhauled just about everything out of Canada that they wouldn’t allow us to dispose of there. And we worked closely with them (Canadian government) on that.”[121] The stations reverted to Canadian control when the pipeline was closed.

The Haines-Fairbanks Pipeline impacted the environment in Canada and Alaska. The pipeline right-of-way and pump stations altered the natural landscape and fuel spills contaminated the environment. The long-term effects of these impacts on subsistence resources, native Alaskan and Canadian traditional life-styles and health, and the health of pipeline employees are important subjects that are beyond the scope of this report. It is recommended that these topics be explored in future studies.

Today we look at the Haines-Fairbanks Pipeline with the advantage of hindsight. The lack of consultation with native groups for use of the land and the environmental damage resulting from the operations must be acknowledged – but it must also be understood in the context which the system operated. Pollution control, cultural resources management, and consideration for tribal sovereignty were not issues addressed the way they are today. At the time of its operation, the Haines-Fairbanks Pipeline was considered the best means of conveying the vast quantities of fuel needed in interior Alaska.[122]

Table 4. Current Status of Haines-Fairbanks Pipeline pump stations (2003).[123]

Haines, Alaska	Demolition scheduled for 2003
Border, Canada	Demolished
Haines-Junction, Canada	Standing
Blanchard River, Canada	Converted to highway maintenance facility
Destruction Bay, Canada	Standing
Donjek, Canada	Standing
Beaver Creek, Canada	Standing
Lakeview, Alaska	Converted to highway maintenance facility
Tok, Alaska	Demolition commenced 2002, scheduled for completion 2003
Sears Creek, Alaska	Standing
Timber, Alaska	Standing
Fort Greely tank farm, Alaska	Demolished
Birch Lake tank farm, Alaska	Demolished
Fairbanks, Alaska	Standing

[121] Ibid. p. 3.

[122] For more information on pipeline impacts to cultural resources at Tok see Jim Simon’s (2002) *ALCANGO (Haines-Fairbanks Pipeline) Tok Terminal Traditional Cultural Property Evaluation Report.* For information on pipeline impacts at Haines see Northern Land Use Research Inc. (1998) *Cultural Resource Survey of the Haines Fuel Terminal, Haines, Alaksa: Final Report on the Archaeology of Tanani Point.*

[123] Douglas Johnson, Chief Environmental, Department of Public Works. 2003. Personal Communication with author.

Bibliography

INTERVIEWS:

Layton Bennett, interviewed by Kristy Hollinger, 12 April 2002.

Johnny Burnham, interviewed by Kristy Hollinger, 7 May 2002

Ray Carder, interviewed by Kristy Hollinger, 8 April 2002.

Richard Duke, interviewed by Kristy Hollinger, 25 April 2002.

June Hass, interviewed by Kristy Hollinger, 12 April 2002.

Frank Haas, interviewed by Pam Moore 29 April 1992. On file at the Sheldon Museum & Cultural Center, Haines. Tape # 92.210.01.

Dwight and Carley Hanson, interviewed by Kristy Hollinger, 7 May 2002.

Edward and Elizabeth Karmen, interviewed by Kristy Hollinger, 11 April 2002.

Earnest and Laura Kelly, interviewed by Kristy Hollinger, 11 April 2002.

John Koehler, interviewed by Kristy Hollinger, 10 April 2002.

George Lyle, interviewed by Kristy Hollinger, 12 July 2002.

Vern McConnell, interviewed by Kristy Hollinger, 12 July 2002.

Jeannie Menaker, David Menaker and Joyce Thomas, interviewed by Kristy Hollinger, 10 April 2002.

Clarence Sparks, interviewed by Kristy Hollinger, 7 May 2002.

Thomas Webster, interviewed by Kristy Hollinger, 29 October 2002.

PERIODICALS:

Drapeau, Raoul. “Pipe Dream.” *Invention & Technology* (Winter 2002) 25- 35.

George, Warren. “The Alaska Pipeline.” *The Military Engineer* 47:320 (Dec 1955) 460-463.

Huttlinger, J. “Contract Awarded for Strategic Alaskan Line” *World Petroleum* 24:13 (Dec. 1953) 55, 96.

Judah, Melvin A. “Alaskan Products Line Completed.” *Pipeline Industry.* 3:4 (Oct 1955) 47-49.

Ross, F.K. “Alaska Pipeline Facelifting.” *Pacific Builder and Engineer.* 68:9. (1962). 82-83.

Woodman, B. “Alaska’s Other Pipelines.” *Alaska Construction & Oil* 12:3 (March 1971) 18-34.

“The Alcango Pipeline: Part 1 of 2.” *Western Construction* 30:2 (Feb. 1955): 37-38.

“Alacango Pipeline, Part 2 of 2 Construction 620 Miles of Trouble.” Western Construction 30:3 (March 1955) 29, 32, 35, 38.

"Joint Defense Plans Served by Alaska Products Pipe Line." *Oil in Canada* 7:48 (Sep. 1955) 62-72.

"Pipeline…Haines to Fairbanks." *Pacific Builder and Engineer* 61:3 (March 1955) 60-62.

"Push Pipeline Across Alaska." *Construction Methods and Equipment* 37 (March 1955): 60-62

"Tanker Arrives in Alaska…Delivers First Fuel for Line." *Oil and Gas Journal* Vol. 54 (June 1955) 65, 66.

Woodman, Betzi. "Special Problems in underground….Pipe Corrosion Control." University of Alaska Anchorage, Consortium Library Archives and Manuscripts Department. U.S. Army Alaska Haines-Fairbanks Pipeline collection. First Report, Alaskan Command Natural Resource Information Exchange. 11 Jan 1971.

NEWSPAPER:

Pipeline Edition: Anchorage Daily News. 11 October 1955. (various articles)

ELECTRONIC SOURCES:

http://www.msc.navy.mil/N00p/4959.htm (Military Sea Lift Command)

http://www.t-6.com/Twelfthaviation/support/History.html (12th Aviation Company, FWA, pipeline surveillance)

REPORTS:

Garfield, D.E., Ashline, C.E., Haines, F.D. and Ueda, H.T. Haines-Fairbanks Pipeline: Design, *Construction and Operation.* SR 77-4 CRREL. February 1977.

Harding Lawson Associates, *Work Plan Fuel Terminal Site Investigation, Haines, Alaska.* 10 Nov. 1992.

Menders, Paul. Economic Staff Group, Northern Development Branch, D.I.A.N.D. *First Draft Report: An Evaluation of the Economics of Utilizing the Haines – Fairbanks Pipeline for Civilian Purposes.* 29 April 1970.

Northern Land Use Research, Inc.: Bowers, Peter M., Higgs, Andrew S., Williams, Catherine M. *Cultural Resource Survey of the Haines Fuel Terminal, Haines, Alaska: Final Report on the Archaeology of Tanani Point.* Report prepared for U.S. Army Corps of Engineers, Anchorage, AK. April 1998.

Northern Land Use Research, Inc: McIntosh, Stacie, J., Bowers, Peter M., Higgs, Andrew S., Williams, Catherine M. *Tanani Subsistence.* Report prepared for: Central Council Tlingit and Haida Indian Tribes of Alaska. March 2000.

Pamphlet 360-1. *Description of Alaskan Military Petroleum Facilities.* 172nd Infantry Brigade (Alaska) 15 January 1982.

Price, Kathy. *Northern Defenders: Cold War Context of Ladd Air Force Base, Fairbanks, Alaska*: 1947-1961. CEMML TPS 01-2. January 2001.

Rickard, Warren E., and Deneke, Frederick. *Preliminary Investigations of Petroleum Spillage, Haines-Fairbanks Military Pipeline, Alaska.* U.S. Army Corps of Engineers, Cold Regions Research and Engineering Laboratory. Hanover: New Hamshire, April 1972.

Simon, Jim and Gelvin-Reymiller, Carol. ALCANGO *(Haines-Fairbanks Pipeline) Tok Terminal Traditional Cultural Property Evaluation Report.* Tanana Chiefs Conference, Inc. Community and Natural Resources Department of Defense Office. Submitted to: US Army Corps of Engineers. 18 Jan 2002.

Socioeconomic Community Profiles, A Background for Planning. Delta Junction, Dot Lake, Norhtway, Tanacross, Tetlin, Tok. Northwest Alaskan Pipeline Company, 1980.

Champagne and Aishihik First Nations. "Summary of the Non-Native Activities in the Klukshu Reserve Area and Their Impact on Traditional Life: A Response to the Federal Offer Respecting the Klukshu Specific Claim." 27 September 1994.

Human-McDowell Associates. "A Study of the Feasibility of Converting the Haines Tank Farm to a Maintenance, Refueling and Watering Facility for the Alaska Marine Highway System." For Legislative Affairs Agency, Research Division. Gregg K. Erickson, Director. Juneau, AK. 30 April 1979.

CORRESPONDENCE:

Alaska State Archives, Record Group 101. Office of the Territorial Governor, Series 130, Governor's Correspondence. Haines Business Council to the President of the United States. 25 June 1956.

Governor B. Frank Heintzlemen to Mr. Leonard King, Haines Business Council. 27 June 1956.

Keith H. Ewbank, Colonel, GS, Chief of Staff to B. Frank Heintzleman, Governor of Alaska. Headquarters, United States Army, Alaska, Office of the Chief of Staff. 1 Aug 1956.

Department of External Affairs, Canada. Note No. 63. Ottawa, April 19, 1962.

Embassy of the United States of America, Note No. 227. Ottawa, April 19, 1962.

Department of External Affairs, Canada to Ambassador of the United States of America, His Excellency the Honourable Stanley Woodward, Ottawa, August 10, 1950.

MISCELLANEOUS:

Determination of Eligibility for the Tok Terminal and Pump Station (TNX-0050) the Haines to Fairbanks Pipeline, Tok, Alaska.

Defense Environmental Restoration Program, Formerly Used Defense Sites, Findings and Determination of Eligibility. Alaskan Petroleum Pipeline System, Haines-Fairbanks Division, Alaska. Property No. F10AK1016.

"Pipeline to Reopen." Press Release Number 78-6-20-94, Public Affairs, 172d Infantry Brigade, Fort Richardson, Alaska. 22 June 1978.

Department of the Army, Job Description, Fort Richardson, Alaska. Job No. 6984a, Fuel Distribution System Operator, Grade 11, OCC Code 5413, 13 Feb. 1963. Courtesy of George Lyle.

Haas, Frank M. "The Haines-Fairbanks Pipeline October, 1955 – October, 1971." On file at the Sheldon Museum & Cultural Center. Haines, AK.

Fluor Corp., Ltd. Los Angeles, California. U.S. Army Corps of Engineers, Alaska District: *Products Pipeline: Haines to Fiarbanks Alaska, Operating Manual.* May 1955.

Fradkin, Philip. "The First and Forgotten Pipeline." Source unknown.

Woodman, Lyman L. (1997) *Duty Station Northwest, The U.S. Army in Alaska and Western Canada, 1867-1945, Volume Two 1918-1945.* Anchorage: Alaska Historical Society

Harding Lawson Association, Engineering and Environmental Services "Work Plan: Fuel Terminal Investigation: Haines, AK." HLA Project No. 20801. 10 Nov. 1992.

"History of the Alaskan Command, 1 July 1956 – 30 June 1957." Prepared by the Office of Information Services, Alaskan Command.

"Alaskan Command History 1969." Prepared by the Historian, Office of the Secretary. Joint Staff Headquarters ALCOM.

"Alaskan Command History 1972." Prepared by the Historian Office of the Secretary, Joint Staff, Headquarters ALCOM.

University of Alaska Anchorage, Consortium Library Archives and Manuscripts Department.U.S. Army Alaska Haines-Fairbanks Pipeline collection. First Report, *Alaskan Command Natural Resource Information Exchange.* 11 Jan 1971.