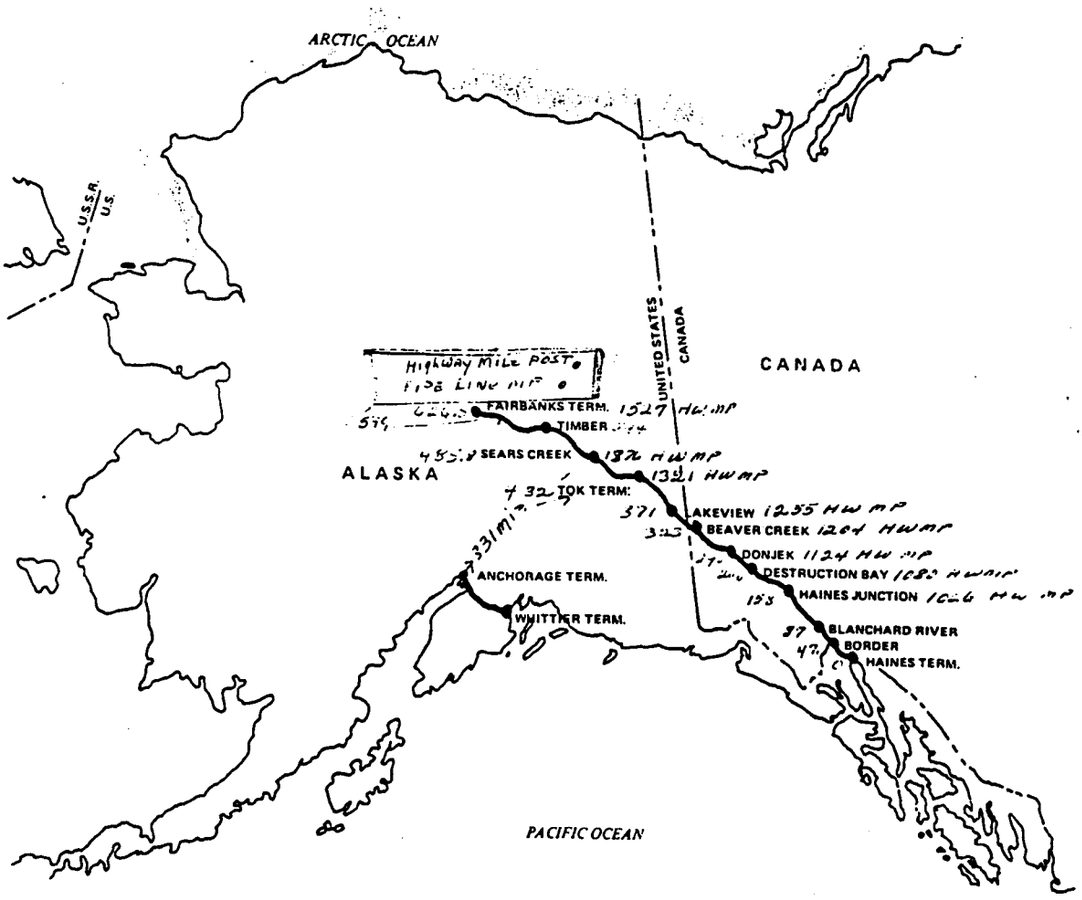
Opal Wells

HEADQUARTERS, PETROLEUM DISTRIBUTION OFFICE

HAINES—FAIRBANKS PIPELINE
WHITTIER—ANCHORAGE PIPELINE



General Description of Facilities

Pamphlet 360—1

1 December 1968

DEPARTMENT OF THE ARMY
HEADQUARTERS PETROLEUM DISTRIBUTION OFFICE
USARAL Support Command
APO 98749

* * * * * *

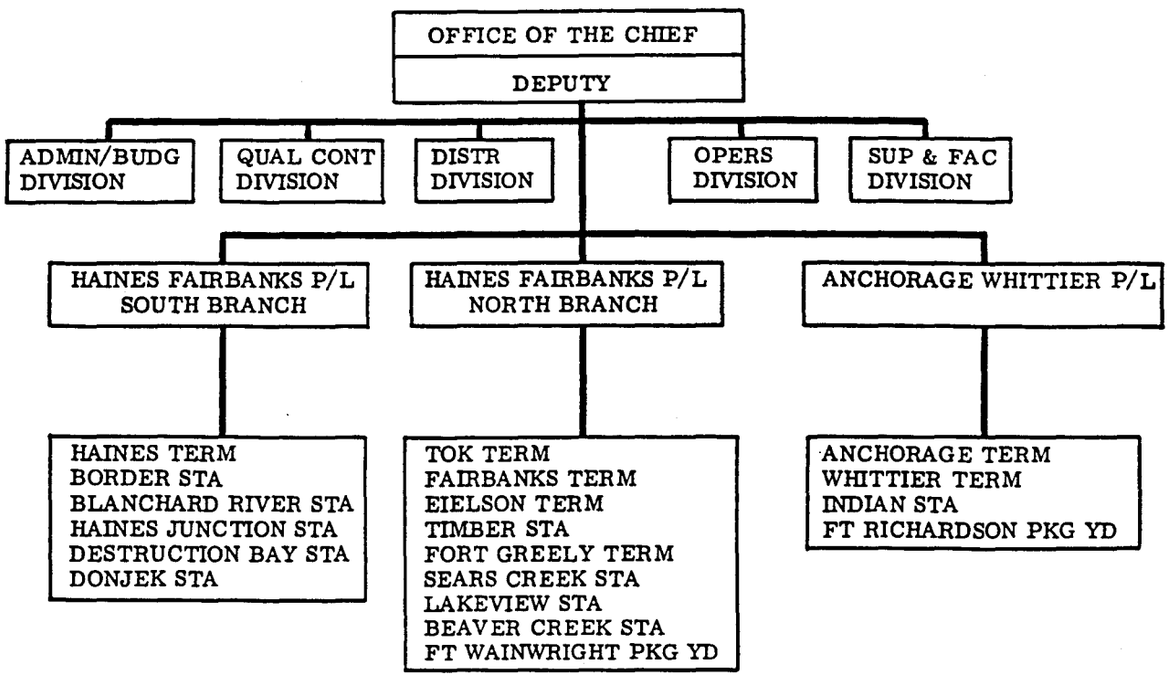
DESCRIPTION OF FACILITIES
USARAL Support Command
PETROLEUM DISTRIBUTION OFFICE

* * * * * *

Prepared By:

PETROLEUM DISTRIBUTION OFFICE
USARAL Support Command
1 October 1968

PETROLEUM DISTRIBUTION OFFICE



INDEX

SECTION I

ORGANIZATION AND MISSION

1. GENERAL. The Petroleum Distribution Office (PDO) is an element of USARAL Support Command, United States Army Alaska, and was established by General Order Number III, USARAL, dated 23 June 1965. PDO is governed by Intergovernmental Agreement "Defense Haines/Fairbanks Pipeline Installation" and Interservice Agreements with the United States Air Force, Aero Space Fuels, and Alaska Air Command. PDO Headquarters is located in Building T-759, Fort Richardson, Alaska.

2. MISSION AND FUNCTIONS.

a. Office of the Chief:

(1) Directs and supervises operation and maintenance of the USARAL Petroleum Distribution System, including facilities and equipment. Exercises supervision of certain prescribed functions normally assigned to an installation commander under provisions of AR 210-10, e.g., construction and other work incident to the maintenance, repair and preservation of the real property involved in operation of the Petroleum Distribution System.

(2) Develops stated POL requirements and distribution plans, and receives and maintains stock status data for accomplishing command responsibilities generated by logistical policy and planning guidance provided by the ALCOM and USARAL Staffs.

(3) Exercises quantity and quality control over the annual resupply program (Cool Barge, Alaska) of petroleum products. Conducts the USARAL quality surveillance program and that portion of the Alaska Command Program as directed and required by joint regulations.

(4) Advises the Commanding Officer and staff on matters pertaining to petroleum distribution operations, and presents to the Commander and staff information required to make sound decisions.

b. Deputy:

(1) Serves as the immediate assistant to the Chief, Petroleum Distribution Office, and on the vasis of established policy, makes such supplemental decisions required to execute tasks essential to effective performance of mission.

(2) Coordinates the activities of the Petroleum Distribution Office in conformance with policies issued by higher authority, and informs the Chief on matters pertaining to the general efficiency of the Petroleum Distribution System.

(3) Represents the Chief, Petroleum Distribution Office, on occasions the Chief may direct.

c. Administration and Budget Division:

(1) Maintains the manpower program for the system.

(2) Performs records management and reports control services.

(3) Prepares and administers the Petroleum Distribution Budgetary Program.

(4) Maintains, controls and safeguards classified material, and conducts the security program for Petroleum Distribution System.

(5) Coordinates all military and civilian personnel matters.

(6) Administers the housing program for the system.

d. Quality Control Division:

(1) Serves all Military Departments and the Theater Command in determining quality status of petroleum assets in the Theater.

(2) Operates and maintains five laboratory testing facilities serving all components of the Alaskan Command.

(3) Renders technical assistance and guidance to Army, Navy, Air Force and other governmental agencies as required.

(4) Administers the quality surveillance mission for USARAL.

(5) Effects procurement inspection of petroleum products for the Alaska Command.

e. Distribution Division:

(1) Plans, controls and supervises the supply of all petroleum products to the Alaska Mainlar Military Installations and other governmental agencies.

(2) Schedules, receives, stores and distributes petroleum products to the Alaskan Mainland and other governmental agencies and installations.

(3) Maintains formal accountability for Army Stock Fund and informal accountability for Air Force Stock Fund petroleum products.

(4) Prepares Financial Inventory Accounting Data to Army and Air Force Stock Funds (and Finance and Accounting Officers).

(5) Coordinates and prepares documentation for reimbursement of Petroleum products supplied to governmental agencies other than the Army and Air Force.

(6) Establishes, receives and revises petroleum products operating and reserve stock levels and tankage requirements in coordination and conjunction with CONUS Petroleum agencies, ALCOM an its component commands.

(7) Provides technical assistance in petroleum supply operations at USARAL installations.

(8) Effects local procurement and coordinates the procurement of petroleum products by the commercial contract bulletin or specific commercial contracts within Alaska.

(9) Maintains accountability, and provides F & AO with documentation for billing units for retail issues of bulk petroleum products at Fort Richardson, Fort Wainwright and Fort Greely.

f. Supply and Facilities Division:

(1) Plans, controls, coordinates and supervises the engineering, maintenance and supply of the Petroleum Distribution Systems, their facilities and equipment.

(2) Plans, controls and supervises the performance of Engineer activities relating to Utilities, Buildings and Grounds, Fire Protection/Prevention and Safety.

(3) Conducts the Equipment Maintenance Management Program to include Material Readiness.

(4) Manages and controls the repair, modification and alteration of petroleum distribution systems and equipment above organizational maintenance level.

(5) Preparations, administration and inspection of new, one-time or recurring contracts for operation, maintenance and supply of the Installation type facilities.

(6) Maintains Real Estate and Installed Property Records to include leases, agreements and contracts relating to real property.

(7) Engineers and controls all modifications, alterations and minor new construction which includes design and drafting.

(8) Plans, schedules, analyzes and evaluates the installation Facilities Operation and Maintenance Program which includes work reception, job estimation and supply coordination (LMMF Activities).

(9) Establishes stock level for items of supply stocked for LMMF purposes; discloses and reports excess supplies; initiates procurement action to replenish stock as required; supervises LMMF warehouse operations and conducts inventories; maintains LMMF property records and stock control system; prepares and monitors the supply portion of the yearly procurement schedules; prepares and monitors the yearly inventory plan.

(10) Provides installation-type, and "other than R & U supplies, within the formal R & U Account, ACL 411."

g. Operations Division:

(1) Provides supervision of the receipt, storage, movement and issue of bulk and package petroleum on the Alaskan Mainland.

(2) Operates the Haines/Fairbanks Pipeline (628 miles).

(3) Operates the Whittier/Anchorage Pipeline (62 miles).

(4) Operates marine and dispensing terminals at Whittier, Anchorage, Elmendorf AFB, Fort Richardson, Fort Greely, Eielson AFB, Fort Wainwright, Tok and Haines.

(5) Operates package product yards at Fort Richardson, Fort Greely and Fort Wainwright.

(6) Exercises continuous dispatch control and supervision over products movement through the Haines/Fairbanks and Whittier/Anchorage Pieplines.

(7) Assures quality control of products and facilities which includes, but is not limited to, sampling petroleum products, cleaning tanks and appurtenances, proper segregation of pipeline batches and any inspection relative to quality control.

(8) Performs quantity control measures such as gauging petroleum quantities, computing inventories, compiling receipts and issues, and submitting proper documentation to insure proper financial accounting and stock management.

(9) Plans, develops and conducts short range, long range and emergency plans for physical security, manpower training and utilization and insuring adequate mission facilities and capabilities.

h. Pipeline Pump Stations: Border (BC), Blanchard (YT), Destruction Bay (YT), Donjek (YT), Beaver Creek (YT), Lake view (Alaska), Sears Creek (Alaska), Timber (Alaska).

(1) Each Station Foreman is responsible for the operation, organizational maintenance and management of a particular station.

(2) Responsible for movement of petroleum through the pipeline.

(3) Performs organizational maintenance and minor construction of pipeline equipment and appurtenances in the area of his station.

i. Terminals: Anchorage-Elmendorf, Fort Richardson, Whittier, Fort Greely, Eielson Air Force Base, Fairbanks, Tok and Haines.

(1) Each Terminal Foreman is responsible for the operation of the bulk petroleum facilities at respective terminals, and supervises the storage of package petroleum products at Fort Greely, Fort Richardson and Fairbanks Terminal.

(2) Anchorage-Elmendorf.

(a) Responsible for operation, organizational maintenance and management of the bulk petroleum storage facilities and distribution system.

(b) Responsible for off loading tankers at Anchorage City Petroleum Dock.

(3) Whittier.

(a) Responsible for operation, organizational maintenance and management of bulk petroleum storage facilities and distribution system.

(b) Responsible for the operation of POL Dock.

(c) Responsible for operation and supervision of family housing (Hodge Building).

(d) Operation of input pump station for Whittier/Anchorage Pipeline.

(4) Fort Richardson Terminal.

(a) Responsible for the operation and management of the terminal to include package yard operations and the receipt and issue of bulk petroleum products.

(b) Assures the deliveries of all bulk retail petroleum products to the Fort Richardson complex to include the missile sites.

(5) Fort Greely Terminal. Responsible for operation and management of the bulk petroleum storage facility and distribution system, to include the receipt, storage and issue of packaged and bulk retail petroleum products.

(6) Eielson Air Force Base. Responsible for operation of the bulk petroleum storage facilities and issuing system.

(7) Fairbanks Terminal.

(a) Responsible for operation, organizational maintenance and management of bulk petroleum storage facilities and distribution system, to include operation of package products yard.

(b) Assures the deliveries of all bulk retail petroleum products to the Fort Wainwright complex to include the missile sites.

(8) Tok Terminal.

(a) Responsible for the operation and management of the bulk petroleum storage and distribution facility.

(b) Operations of a mainline pump station for Haines/Fairbanks Pipeline.

(c) Responsible for operation and supervision of family housing.

(9) Haines Terminal.

(a) Responsible for the operation and management of the bulk petroleum storage and distribution facilities.

(b) Responsible for the operation of POL Dock.

(c) Responsible for operation and supervision of family housing.

(d) Operation of input pump station for Haines/Fairbanks Pipeline.

SECTION II

HAINES/FAIRBANKS PIPELINE FACILITIES AND OPERATION

1. GENERAL DESCRIPTION. The Haines/Fairbanks Pipeline was constructed to transport liquid fuels from the deep water port of Haines, in southeastern Alaska, to military installations North of the Range in the interior of Alaska. To meet the military needs, petroleum products from ocean tankers or tanker barges are received in bulk terminal facilities at Haines. From this point, the petroleum products are transported by the 8-inch, multi-product pipeline to the Fairbanks area. Passing over 25 major river crossings, 82 minor stream crossings, 49 major highway crossings, 39 secondary road crossings and 11 major swamp tundra crossings, the pipeline extends over the coastal mountain range, and through the plateaus and valleys of the Yukon Territory, the Province of British Columbia, and the State of Alaska. Along this route temperatures have ranged from a low of -83°F at Snag, Yukon Territory, to a high of 92°F at Fairbanks, Alaska, a range of 175°F. The initial cost of the project was $38,249,796; however, subsequent construction has increased the overall cost to $43,749,796. The product held in the line at any time during operations is 210,000 barrels valued in excess of $1,500,000. The line is composed of 626 miles of 8-inch pipeline, nine booster pump stations (Border, Blanchard River, Junction, Destruction Bay, Donjek, Beaver Creek, Lakeview, Sears Creek and Timber), Fort Greely Take-off Station, Birch Lake Tank Farm, and supporting terminal bulk storage tanks and related equipment and facilities at Haines, Tok, Eielson Air Force Base and Fairbanks.

2. DESIGN AND CONSTRUCTION. The design of the pipeline was accomplished for the Corps of Engineers by the Fluor Corporation, Los Angeles, California, during the period 1950-1952. Bids were advertised in the fall of 1953 and contract was awarded to Williams Brothers of Tulsa, Oklahoma, McLaughlin Inc. of Great Falls, Montana and Marwell Construction of Vancouver, B. C., Canada, a joint venture organization.. Field construction began early in 1954 with the main pipeline essentially completed before the winter season of 1954 to 1955; stations and storage facilities being completed during the summer of 1955, and the necessary testing of the line completed prior to 12 October 1955, on which date the United States Army, Alaska, accepted the pipeline and facilities. The bachelor quarters, laboratory and refrigeration buildings at Haines were constructed under a separate contract.

3. ROUTE. The Haines/Fairbanks Pipeline begins at Lutak Inlet, approximately 3½ miles north of Haines, Alaska, and follows the Haines Highway into Canada to Haines Junction, then along the Alaska Highway via Tok, Big Delta, Eielson Air Force Base and to its terminus at Fairbanks Terminal, 7 miles northeast of Fairbanks, Alaska. Most of this line is surface laid. The sections from Haines Terminal to a point 42 pipeline miles northward, and from Big Delta to Fairbanks Terminal are buried (96 pipeline miles.) These sections were buried to minimize the hazard to private property and residents in these more congested areas, and to protect the pipeline from damage by heavy vehicular equipment. In addition, short sections along the route are buried to protect station personnel, equipment and the line from possible vehicular damage and washouts during flash floods.

4. PROFILE. Six hundred twenty-six miles of pipeline extend from Haines, Alaska (elevation 30') to Fairbanks, Alaska (elevation 430'). While the net vertical rise is only 400', the pipeline system is complicated by a peak elevation of 3,750' at Milepost 57. Other elevations of 3,300' at Milepost 90; 3,350' at Mileposts 162 and 175; 3,050' at Milepost 252; 1,890' at Milepost 445; and 1,900' at Milepost 564 are limiting factors to the gradient at normal line throughput.

5. MULTI-PRODUCT PIPELINE. a. Orininally, the design criteria indicated that fuels to be transported through the pipeline would include:

(1) Diesel Fuel, Arctic Grade C.
(2) Aircraft Turbine and Jet Fuel, JP-3.
(3) Vehicle Motor Gasoline, Grade 72 Octane.
(4) Aircraft Reciprocating Engine Fuel, Grade 100/130.
(5) Aircraft Reciprocating Engine Fuel, Grade 115/145.

b. Currently, fuels being transported through the line are:

(1) Diesel Fuel, Grade DFA.
(2) Aircraft Turbine and Jet Engine Fuel, Grade JP-4.
(3) Automotive Combat Gasoline, Grade 95C.
(4) Aviation Gasoline, Grade 115/145.

6. TANKAGE.

Station	Number of Tanks	Normal Barrels Per Tank	Total Capacity Barrels
Haines Terminal	1	110,000	110,000
	9	30,000	270,000
	2	5,000	10,000

Station	Number of Tanks	Normal Barrels Per Tank	Total Capacity Barrels
Tok Terminal	9	30,000	270,000
	3	5,000	15,000
Fort Greely	2	15,000	30,000
	4	10,000	40,000
	2	2,250	4,500
Birch Lake	2	6,600	13,200
Fort Wainwright	2	25,000	50,000
	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
	4	16,000	64,000
	9	10,000	90,000
			1,271,650

The 8-inch line was designed to operate at normal throughput rates with only Haines, Border and Tok Pump Stations in operation. The line was originally designed to reach "emergency" throughput rates by placing Junction and Donjek Pump Stations (booster-type) into operation, to supplement Haines, Tok and Border Pump Stations. Since the original design criteria, subsequent requirements have made it necessary to install six additional pump stations which will provide 27,500 BPD throughput. These new stations are Destruction Bay, Blanchard River, Beaver Creek, Lakeview, Sears Creek and Timber.

7. CURRENT PUMPING OPERATIONS. It is necessary to operate at approximately 450 BPH to maintain turbulent flow. This can be accomplished by operating varied arrangements of pump stations or pumps at the same time.

From Haines Terminal to:	Miles Between Stations	Total Miles
Border Station	47	47
Blanchard River	40	87
Junction	71	158
Destruction Bay	51	209
Donjek	39	248
Beaver Creek	76	324
Lakeview	45	369
Tok	61	430
Sears Creek	54	484
Fort Greely	44	528
Timber	15	543
Birch Lake	26	569
Eielson	29	598
Fairbanks	28	626

8. PIPELINE PRODUCT DISPATCHING. a. All dispatching of products through the pipeline is based on movement instructions from the Dispatch Division at Fort Richardson, Alaska. The Dispatcher's Control Board, a manually operated panel, presents the pipeline in a graphic form. The panel is operated in conjunction with a telephone-teletype communication system to all pipeline installations and constitutes the nerve center for conducting product movement operations through the pipeline.

b. The Control Board consists of three parts; (1) paper tape scaled to 1/8 inch per 100 barrels, (2) a pipeline scale profile, and (3) devices for determination of variations of volume due to changes in operating temperatures and pressures.

c. The scaled paper tape is used to accurately plot the complete displacement of the products in the line by "batches", corrected to reference pressures and temperatures and other operating data such as time of entry into the line, gravity of product, etc. Each "batch" is indicated by product color code on the tape to provide a visual guid as to the contents of the line. The tape is manually advanced in the direction of the flow of the product at hourly intervals, a distance equal to the net quantity of fluid pumped into the line.

9. LINE DELIVERY OF PRODUCTS. Delivery of bulk quantities to designated points are accomplished as follows:

a. Tok Terminal - All products are delivered into terminal storage from the Hanes-Fairbanks Pipeline.

b. Fort Greely Take-off Station - Products are delivered to Fort Greely by taking "heart cuts" from passing "batches" scheduled for installations further north.

c. Birch Lake Tank Farm - Products are delivered to Birch Lake Tank Farm by taking "heart cuts" from passing "batches" scheduled for installations further north.

d. Eielson Air Force Base - Products are delivered into Eielson Air Force Base tankage for Air Force usage from the 8-inch line.

e. Fairbanks Terminal - Products are pumped into terminal storage tanks from the 8-inch line for subsequent delivery to Fort Wainwright and Eielson Air Force Base.

10. PRODUCT EXPANSION AND CONTRACTION IN THE PIPELINE. Once in the pipeline, products are exposed to great variations in the prevailing ambient temperatures along the line. The pipeline is packed (pressured) each time pumping operations are shut down; however, since petroleum products expand and contract with changing temperatures, a continuous build-up and reduction of pressur sures is experienced. To relieve the pressure in the line during temperature rises, product must be "bled off" into appropriate tankage at Tok Terminal, Eielson Air Force Base or Fairbanks Terminal, as approperiate. Conversely, with a drop in ambient temperatures, products contract or shrink, reducing line pressures. Repressuring is not essential in the latter instance, as experience has shown that allowing the line to go slack creates less interfacial mixing than daily repressuring. This expansion and contraction is so great that during a temperature rise, it is possible to receive product at 1,000 BPH at Tok Terminal while pumping at a rate of 500 BPH at the Haines Terminal; and with a sharp temperature decrease, it is possible to pump product into the line at Haines at a rate as high as 500 BPH without receiving product at the Tok Terminal. Due to these conditions, it has been necessary to pump at maximum rates to prevent laminar flow in the line. Evaluation of operational experiences and consultants recommendations point to a requirement for burial of the line to correct these temperature problems. The burial of the line would cost an estimated $3,175,000.

11. SCRAPER TRAPS. Installed in the 8-inch line are seven scraper traps for use in scraper operations for cleaning the line and to assure delivery of clean products. Location of these facilities are as indicated below:

Station Location	Milepost
Haines	0.0
Border	47.3
Junction	158.1
Donjek	248.0
Tok	432.0
Eielson	599.0
Fairbanks	626.0

12. AERIAL SURVEILLANCE OF PIPELINE. To facilitate observation of conditions along the line, and to particularly detect evidence of leaks and line breaks, weekly round trip flights from Haines to Tok or Haines to Fairbanks are made by civilian aircraft under contract to the Government. The pilot reports by radio to the nearest pump station or terminal any observed leaks, breaks or other conditions warranting immediate attention; advising of the existing condition and location by pipeline mile. At the completion of each trip, a teletype message is sent concerning the area observed to the Superintendent of the pipeline for necessary action.

HAINES-FAIRBANKS PIPELINE
8.001" I.D. Welded Steel
Distance 626 Miles

HAINES TO TOK - DISTANCE 432 MILES

NORMAL OPERATIONS

STATION	SUCTION PSI	DISCHARGE PSI	AVERAGE BPH
HAINES	40	1200	
BORDER	400	1440	
JUNCTION	500	1000	
DONJEK	600	1200	
TOK RECEIPTS AT 200 PSI RECEIVING PRESSURE			626

ACCELERATED OPERATIONS

HAINES	43	1340	
BORDER	50	1210	
BLANCHARD RIVER	40	1280	
JUNCTION	40	980	
DESTRUCTION BAY	60	800	
DONJEK	90	1280	
BEAVER CREEK	40	960	
LAKEVIEW	50	1200	
TOK RECEIPTS AT 100 PSI RECEIVING PRESSURE			1165

* * * * * * * * * *

TOK TO FAIRBANKS - DISTANCE 194 MILES

NORMAL OPERATIONS

STATION	SUCTION PSI	DISCHARGE PSI	AVERAGE BPH
TOK	40	1200	
FAIRBANKS RECEIPTS AT 200 PSI RECEIVING PRESSURE			750

ACCELERATED OPERATIONS

TOK	40	1000	
SEARS CREEK	60	1080	
TIMBER	90	940	
FAIRBANKS RECEIPTS AT 100 PSI RECEIVING PRESSURE			1165

LINE IS OPERATED IN TWO SECTIONS AS ALL PRODUCTS ARE TERMINATED AT TOK.

NOTE: Haines Station with positive displacement pumps keeps Border Station supplied with sufficient fuel for that station to hold maximum discharge pressure at all times.

SECTION III

HAINES TERMINAL AND PUMP STATION

1. GENERAL. Haines Terminal and Pump Station, 203 acres in area, is located 3 miles north of the City of Haines on the west side of Lutak Inlet.

2. FACILITIES.

a. Pier.

b. Manifold Building.

c. Tank Farm.

d. Mainline Pump Building.

e. Laboratory Building.

f. Utility Building.

g. Administrative Building.

h. Warehouse-Garage-Shop Building (Machine).

i. Truck Loading Rack.

j. Family Housing.

k. Cold Storage Locker Building.

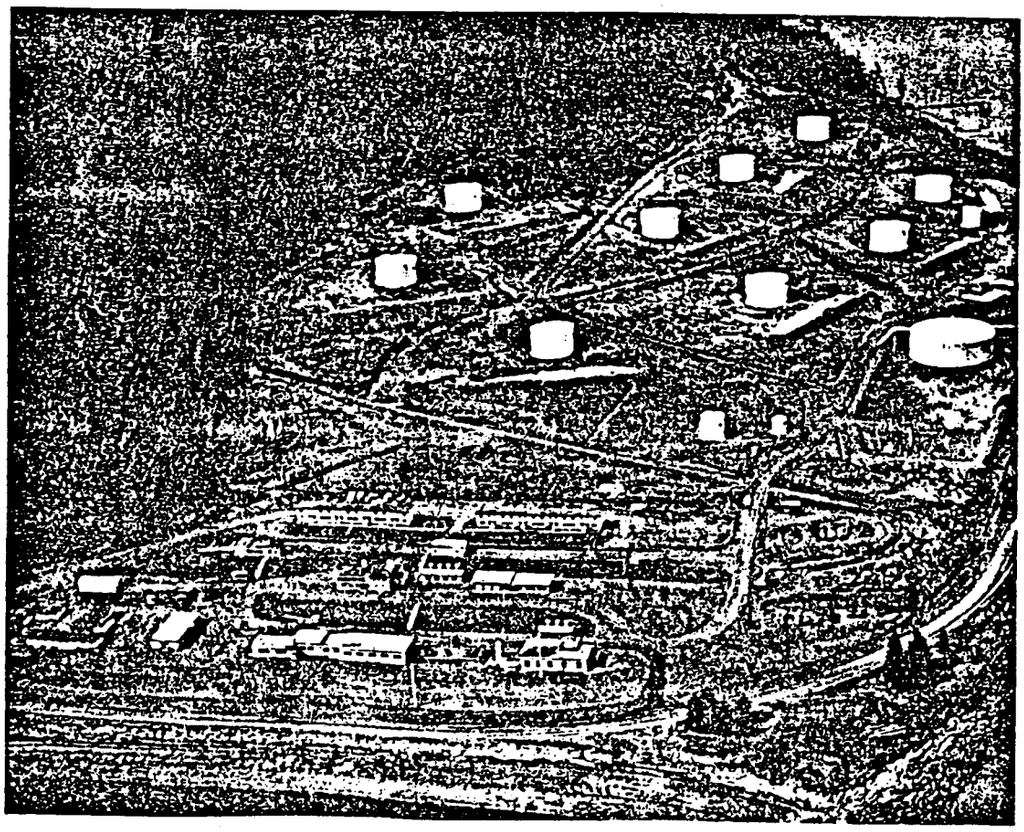
l. Fire Pump Building.

m. Hose Cart Houses.

n. Incinerator.

o. Semi-permanent Buildings.

p. Warehouse Area.



Haines terminal and Pump Station, 203 acres in area, is located 3 miles north of the city of Haines on the west side of Lutak Inlet.

3. PIER. The terminal pier at the north end of the station provides facilities for docking and discharging tankers. It is a T-shaped, concrete decked steel structure capable of mooring a 26,000 D.W.T., tanker. Bow and stern mooring dolphins are provided to hold the vessel in place against spring fenders. These dolphins, 780' apart, are installed on a centerline, 75' shoreward from the spring fenders on the unloading platform, and are equipped with electrically operated cat heads and carrier to main dock. Two derricks are furnished for handling the unloading hoses and the two 15 HP barge stripping pumps. Other facilities at the pier include:

a. Dockmaster's Office consisting of heated office space with toilet and enclosed area for fire foam equipment.

b. Pumphouse with dual gasoline-electric motor driven, 150 HP fire pump.

c. Cathodic corrosion protection system for steel pier structure.

d. Two hose houses (fire hose) and suitably arranged fire hydrants.

e. Drip pans under product hose connections with drain system and sump tank.

f. Floodlights.

g. Six-inch fresh water line for servicing tankers.

4. MAINFOLD BUILDING. This facility houses two transfer pumps, piping, valves and manifolds required to route the products from the petroleum dock to terminal storage tanks, and from terminal storage tanks through two Warner-Lewis Water Separators to the mainline pump building. Products can also be transferred between tanks. Originally designed and constructed as an open building, the manifold building has since been enclosed and provided with heat. Elevation difference between the terminal storage tanks and the manifold building varies from 20' to 102'. Tank elevation measured at grade level varies from 100' to 182'.

5. TANK FARM. The tank farm is a fenced-in area southeast of the petroleum dock, between the dock and terminal buildings. The tank farm consists of twelve product tanks, eleven tanks for products to be transported through the pipeline and one tank for station fuels. The tanks and capacities are as follows:

Tank Number	Capacity in Barrels
100	110,000 Each
101-109	30,000 Each
110-111	5,000 Each
112	1,000 (For Station Use Only)

Each 30,000 barrel tank is equipped with a 40 foot swing line for filling and withdrawal of product. Water drain-off is accomplished by gravity flow from the center sump of the tanks. A 4 inch line runs from the central water draw-off sump to a drain box just outside the tank. The drain box is provided with a 6 inch outlet for disposal of the water. The water draw-off sump operations are manually controlled by a gate valve just outside the tank.

The tanks are situated on a hillside with each tank surrounded by a dike of sufficient capacity to contain 150% of the tank capacity. A ditch and dike across the south side of the tank farm protects station buildings from water run-off or product overflow. Roads in the tank farm area provide access to all tanks.

The fire foam building is situated within the tank farm area with a network of pipes leading to each tank for fire fighting purposes. Either fresh or salt water can be used in this system through use of salt water pump located on the petroleum dock or by gravity from the fresh water tank.

Floodlights are provided for the illumination of the entire terminal area.

A 7,500 barrel fresh water tank is located in the tank farm area for the storage of fresh water used by the installation.

6. MAINLINE PUMP BUILDING. This building is divided into a control room, engine room, pump room, storage room and rest room.

a. The pumping equipment includes three mainline reciprocating Wilson-Snyder quintuplex pumps rated at 272 GPM, 120-70 RPM, 1200 PSI discharge pressure. Each pump is driven by a Chicago-Pneumatic Model 69-CP diesel engine, 6 cylinder, 4 cycle, 720-420 RPM, 285 HP. Engines and pump units are connected by a 6 to 1 geared speed reduction unit. The units will operate individually or in parallel. The maximum station pumping capacity is 1380 BPH with the pumps connected in parallel.

b. Diesel fuel oil is supplied to pump engines from a 1,200 gallon station day tank which is supplied from bulk storage tanks.

c. Engine coolant water is piped from the diesel engines to a 3 unit radiator building and returned to the engines.

d. The control room is isolated by means of a pressure barrier fire wall and door arrangement permitting this room to be pressurized to exclude petroleum vapors. A fire wall isolates the engine room.

e. Two jet strainers are installed on the intake line from the storage area.

f. A product sump within the building is provided to accumulate drain discharges from the strainers. The product in the sump is disposed of by pumping into the line when appropriate.

g. A scraper launcher is located just outside of the building for sending scrapers to Border Station.

7. LABORATORY BUILDING. This building serves as a laboratory for testing all petroleum products handled at the Haines Terminal. It contains an office, laboratory, knock engine room and storage room.

8. UTILITY BUILDING. This building furnishes heat, and electric power for the station. It houses four General Electric 480 volt, 60 cycle, 150 KW, 720 RPM generators driven by four Chicago-Pneumatic 6 cylinder, 4 cycle, 720 RPM, 285 HP, Model 69-CP diesel engines. Cooling water is pumped to a 4 unit radiator building and returned to the engines. For heat, there are three oil fired, 100 HP low pressure (15 PSI) boilers.

9. ADMINISTRATION BUILDING. This building provides office space and 3 place garage.

10. WAREHOUSE-GARAGE-SHOP BUILDING. This is a multi-purpose building containing:

a. A 4 door storage garage for maintenance equipment.

b. A shop for automotive repair and general maintenance.

c. Office, tools and parts storage.

d. Warehouse consisting of approximately 1,000 square feet for heavy item storage and approximately 1,500 square feet containing bins for repair parts and small items.

11. TRUCK LOADING RACK. This facility is of steel frame construction on a concrete foundation, a metal roof and wood plank floor decking with a 3-inch headers, one for diesel fuel and one for motor gasoline.

12. FAMILY HOUSING. Housing at this station consists of permanent type buildings of rigid steel frame construction covered with insulated steel panels. The floors and foundations are concrete, and the roofs are prefabricated steel decking covered with insulating board, built-up composition roof and gravel protective coating. These buildings include the following:

a. One dormitory (CBQ) with a capacity of ten men, including a dining room, kitchen, living room and two latrines, and one shower room.

b. One apartment type building consisting of eight 2-bedroom units.

c. One apartment type building consisting of eight 3-bedroom units.

13. COLD STORAGE LOCKER BUILDING. This is a concrete building with a freeze room (-10°F) which is equipped with individual food lockers.

14. FIRE PUMP BUILDING. This building, adjacent to the Utility Building, houses a dual gasoline engine booster pump to increase water pressure in the lines when needed for fire fighting.

15. HOSE CART HOUSES. There are two hose cart house; one located near the Warehouse-Garage-Shop Building, and one near the Fire Pump Building.

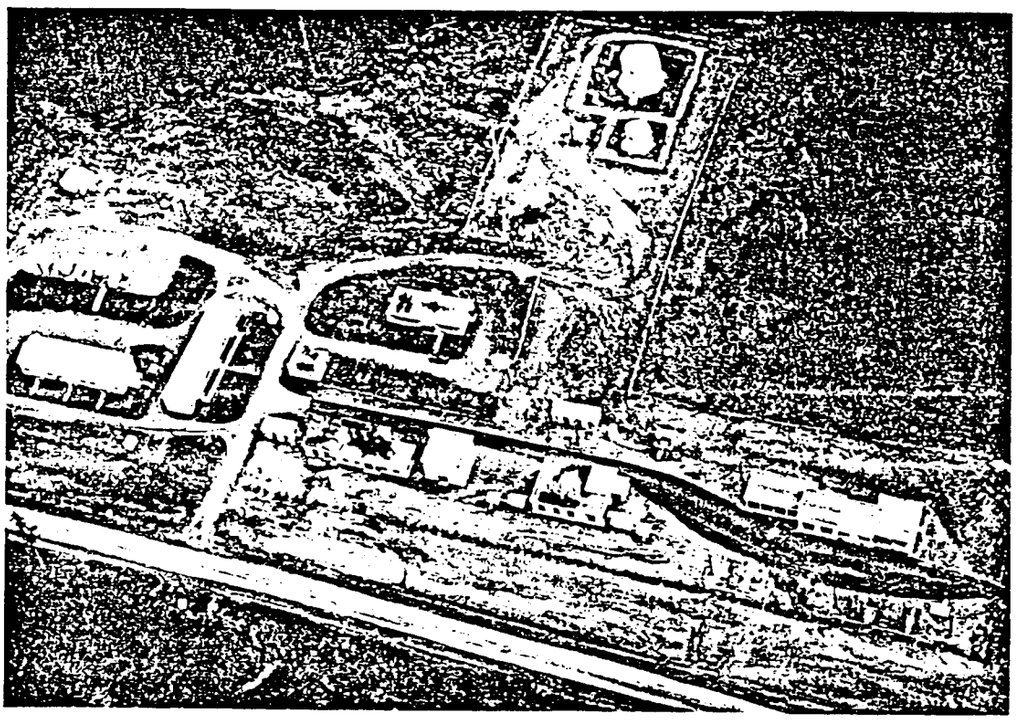
16. INCINERATOR. Fired by a diesel oil burner, the incinerator is suitable for burning rubbish and garbage under all weather conditions.

17. SEMI-PERMANENT BUILDINGS. There are three buildings; two which are used as warehouses, and the other contains a carpenter shop and boiler plant for heating one of the warehouses and carpenter shops.

SECTION IV

BORDER PUMP STATION

1. GENERAL. Border Pump Station is located on the Haines Cut-off Highway approximately 5 miles north of the International Boundary near the Klehini River. There are no nearby towns. The site is 47 miles north of the Haines Terminal at an elevation of 1,300' above sea level. This station is an essential part of the normal pipeline operation with a capacity to pump products over the peak of the entire system at pipeline Milepost 57, elevation 3,750', where the Haines Cut-off Highway and the pipeline cross the Chilkat Pass in the Coast Range. The site is 32 acres in area.



Border Pump Station, 32 acres in area, is located on the Haines Cut-off Highway 47 miles north of Haines.

2. FACILITIES. a. Mainline Pump Building.
   b. Utility Building.
   c. Warehouse-Garage-Shop Building.
   d. Family Housing.
   e. Cold Storage Locker Building.

3. MAINLINE PUMP BUILDING. The interior of this building is divided into an engine room, pump room and a control room. The control room is isolated by means of a pressure barrier fire wall and door arrangement, permitting the room to be pressurized for excluding petroleum vapors from the area. A fire wall isolates the engine room.

a. The pumping facilities at this station consist of three units, each composed of a Chicago Pneumatic Model CP-69, 6 cylinder, 4 cycle, diesel engine driving a Byron Jackson, 4 stage centrifugal pump. The diesel engines are coupled to the pumps by means of a 4,750 to 1 geared speed increaser unit. Engine speed range is from 750 RPM to 573 RPM. Thus, the pump speed range is 3,515 RPM down to 2,722 RPM. Maximum engine brake horsepower is 293. The pumps may be operated individually or in series.

b. Two Moorlane strainers are also housed in the pump house. These strainers serve as both filters and water extractors. A product sump within the building is provided to accumulate the drain discharges from the strainers. The product in the sump is disposed of by pumping into the line when appropriate. Scraper traps are located on each side of the building for receiving and launching scrapers.

c. Engine coolant water is piped from the diesel engines to a 3-unit radiator building and returned to engines.

d. Diesel fuel oil is provided from the 5,000-barrel station storage tank located on a hill above the pump house. This tank is filled from the pipeline at scheduled intervals.

4. UTILITY BUILDING. This is a multi-purpose building which contains:

a. An engine room housing two 150 KW General Electric generators, each driven by a 6 cylinder Chicago-Pneumatic diesel engine identical to those which drive the pipeline pumps. Jacket coolant water is piped from the diesels to a 2-unit radiator building and returned to engines.

b. A pump room housing two domestic water pumps, a fire pump, chlorination equipment and boiler, and cooling water softening equipment. The water system is supplied by a Peerless deep-well pump in an insulated pump house on the bank of the Klehini River. Water is stored in a 60,000 gallon tank in a heated tank house on the station.

c. A boiler room housing three 80 HP low pressure (15 PSI) boilers which furnishes low pressure steam for station heating. Steam distribution and condensate return lines for the station are in underground conduit.

5. WAREHOUSE-GARAGE-SHOP BUILDING. a. Maintenance Shop.
b. Warehouse for spare parts, pipe fittings and tools for station maintenance.
c. Four-place garage for vehicle storage.

6. STATION HOUSING. Housing at this terminal consists of permanent type buildings of wood frame construction; foundation and basement flooring of concrete; upper structure floors of wood-linoleum covered; walls, sheathing and asbestos siding. Roofs are insulated wood decking, with built-up composition and gravel protective coating. These buildings include the following:

a. One dormitory (CBQ) with a capacity of ten men, including a living room, dining room, kitchen and bath, presently being utilized as a one-room school for the station personnel's children.

b. One apartment type building consisting of six 2-bedroom units.

c. One apartment type building consisting of six 3-bedroom units.

7. COLD STORAGE LOCKER BUILDING. This is a concrete building with freeze room (-10°F) and a chill room (35°F) with individual food lockers.

SECTION V

BLANCHARD RIVER PUMP STATION

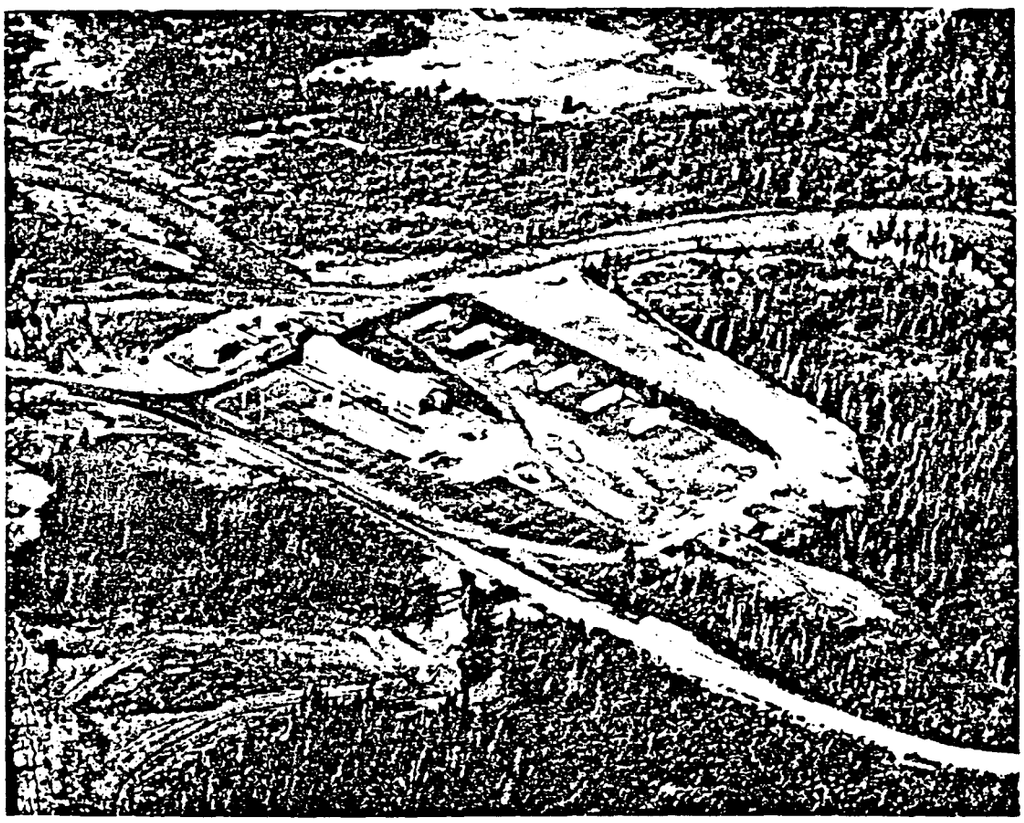
1. GENERAL. Blanchard River Pump Station is located at Milepost 95.8 on the Haines Road. The station area consists of 12.2 acres and is at an elevation of 2,720'.

2. FACILITIES.

a. Combination Building.

b. Family Housing.

3. COMBINATION BUILDING. This building is a one-story construction consisting of engine room, pump, office, generator room and maintenance shop. The engine room is isolated from the rest of the shop by a fire wall.



Blanchard River Pump Station, 12.2 acres in area, is located at Milepost 95.8 on the Haines Road.

a. The pumping facilities consist of three units, each composed of a Chicago Pneumatic Model CP-69, 6 cylinder, 4 cycle, diesel engine driving a Bingham multi-stage centrifugal pump. The diesel engines are coupled to the pumps by means of a Western Gear speed increaser unit. Maximum engine horsepower is 300. The pumps may be operated individually or in series.

b. Two low pressure oil fired steam boilers and two 60 KW generators, which are powered by Caterpillar engines, are located in the generator area.

4. FAMILY HOUSING. The housing facilities are comprised of six 10' by 50' trailers. They are partially furnished and have steam heat piped in from the central heat plant. The utilities are furnished through an underground utilidor running from the utility building. Automatic heat controls are provided in each trailer.

SECTION VI

JUNCTION PUMP STATION

1. GENERAL. Junction Pump Station is located approximately 10 miles northwest of the junction of the Haines Cut-off Highway with Alaska Highway, near Haines Junction, Yukon Territory, Canada. It is approximately 169 miles from the Haines Terminal. The station area consists of approximately 5 acres. The station elevation is 2,722' above sea level at 137° 40' longitude and 60° 55' north latitude.

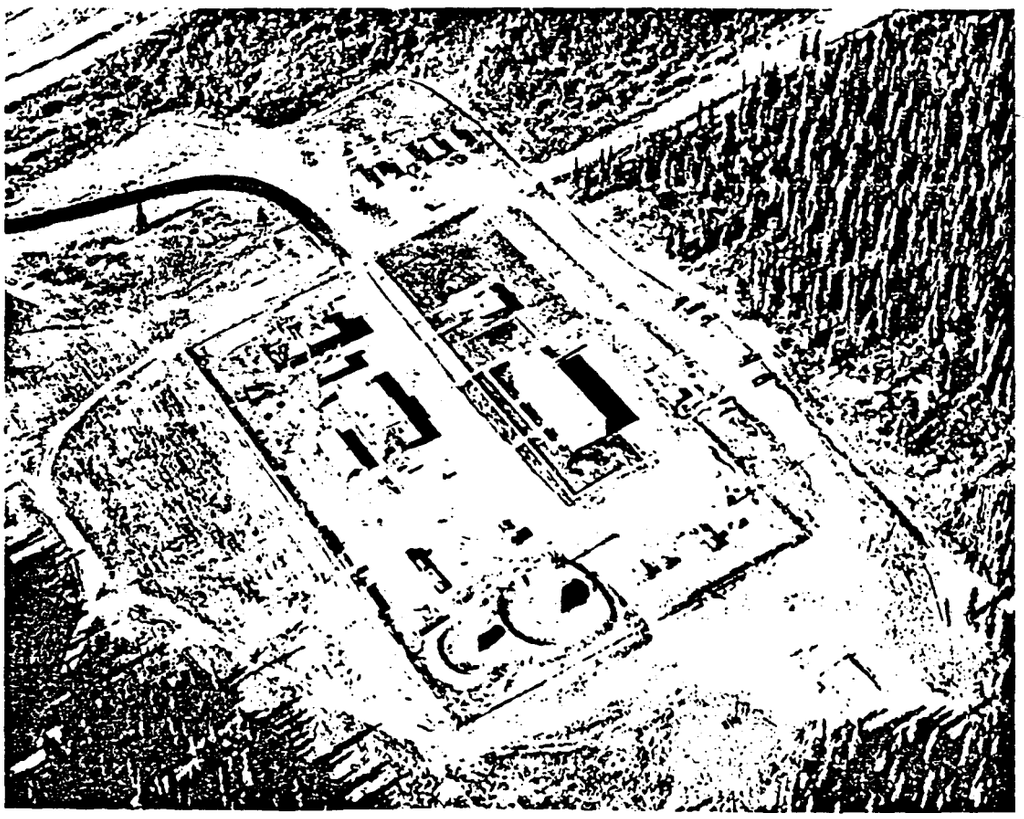
2. FACILITIES. a. Mainline Pump Building.
b. Utility Building.
c. Family Housing.

3. MAINLINE PUMP BUILDING. This building is a single story structure consisting of an engine room, pump room and office. The office is isolated from the pump room by means of a pressure barrier fire wall and door arrangement, permitting the room to be pressurized for excluding petroleum vapors from this area. The engine room is isolated from the pump room by a fire wall.

a. The pumping facilities at this station consist of two units, each composed of a Chicago Pneumatic Model CP-69, 8 cylinder, 4 cycle, diesel engine driving a Byron-Jackson centrifugal pump. The diesel engines are coupled to the pumps by means of a 4,750 to 1 geared speed increaser unit. Engine speed ranges from 705 RPM to 805 RPM. Maximum engine break horsepower is 425. The pumps may be operated individually or in series.

b. Two Moorlane strainers are also housed in the pump house. These strainers serve as both filters and water extractors. A sump tank outside the drain-off product could not be pumped from sump tanks into pipeline. Pumps have been installed to return product to pipeline. The Moorlane strainers are to be replaced by jet type strainers. The pump room is ventilated and the main line is insulated.

c. Scraper traps are located on each side of the building for receiving and launching scrapers through the pipeline.



Junction Pump Station, approximately 5 acres in area, is located 10 miles north of Haines Junction, Yukon Territory, Canada.

d. Cooling jacket water is piped from the diesel engines to a 2-unit radiator building adjacent to the pump house and returned to engines.

e. Diesel fuel oil is provided from a 1,000-barrel station bulk storage tank. The tank is filled from the pipeline at scheduled intervals.

4. UTILITY BUILDING. This is a multi-purpose building containing:

a. Engine room with two power units, each consisting of a Caterpillar Model D-13000 diesel engine driving a General Electric 480 volt, 60 cycle, 50 KW, 900 RPM generator. Radiators are mounted on the diesel engines.

b. A 5-man capacity bunk-room for visiting line maintenance personnel.

c. A garage-shop area.

d. Tool room.

e. A room housing a pneumatic water tank with a Peerless pump.

5. STATION HOUSING. Housing at this station consists of two permanent type houses:

a. One is a single family, 3-bedroom unit for the Station Foreman, and is heated by a forced air, oil-burner fired furnace.

b. One apartment building consisting of five 3-bedroom units heated by a boiler located in the basement.

SECTION VII

DESTRUCTION BAY PUMP STATION

1. GENERAL. Destruction Bay Pump Station is located at Milepost 1080 on the Alaska Highway. The station area consists of 9.9 acres and is at an elevation of 2,780'.

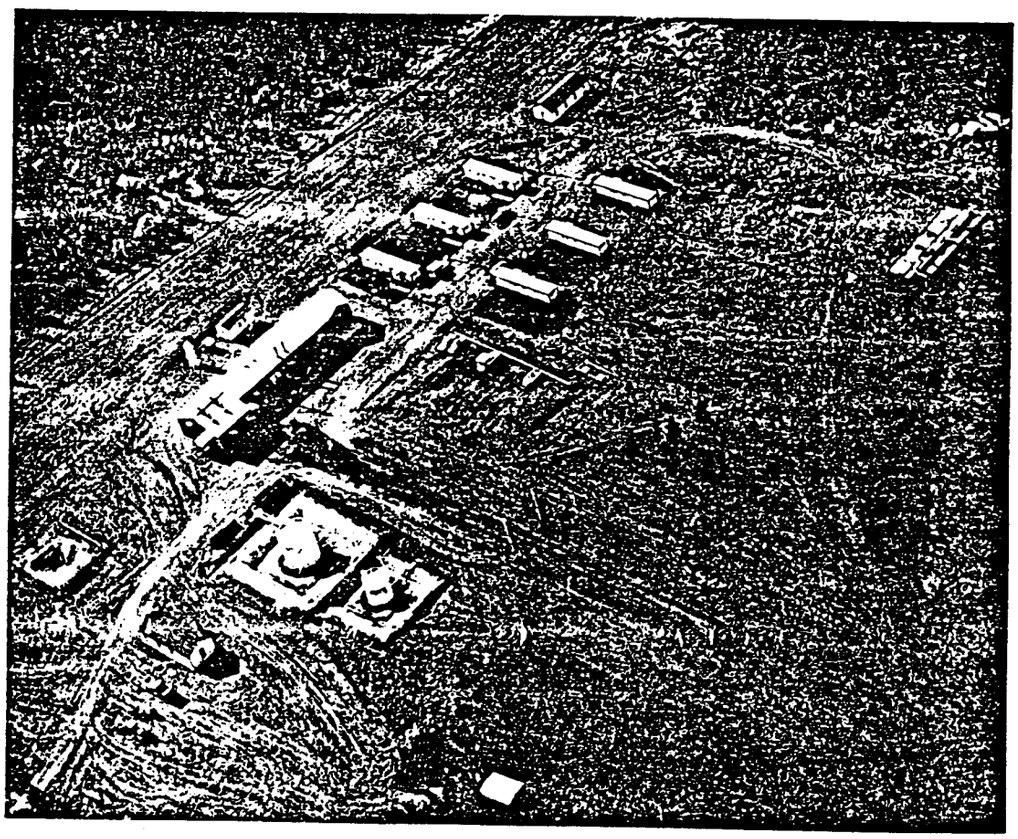
2. FACILITIES. a. Combination Building.
b. Family Housing.

3. COMBINATION BUILDING. This building is one story construction consisting of engine room, pump room office, generator room and maintenance shop. The engine room is isolated from the rest of the shop by a fire wall.

a. The pumping facilities consist of two units, each composed of a Chicago Pneumatic Model CP-69, 6 cylinder, 4 cycle, diesel engine driving a Bingham centrifugal pump. The diesel engines are coupled to the pumps by a means of a Western Gear speed increaser unit. Maximum engine horsepower is 300. The pumps may be operated individually or in series.

b. Two low pressure oil fired steam boilers and two 60 KW generators, which are powered by Caterpillar engines, are in the generator area.

4. FAMILY HOUSING. The housing facilities provided for these stations are comprised of six 10' by 50' trailers at each site. They are partially furnished and have steam heat piped in from the central heat plant. The utilities are furnished through an underground utilidor running from the utility building. Automatic heat controls are provided in each trailer.



Destruction Bay Pump Station, 9.9 acres in area, is located at Milepost 1080 on the Alaska Highway.

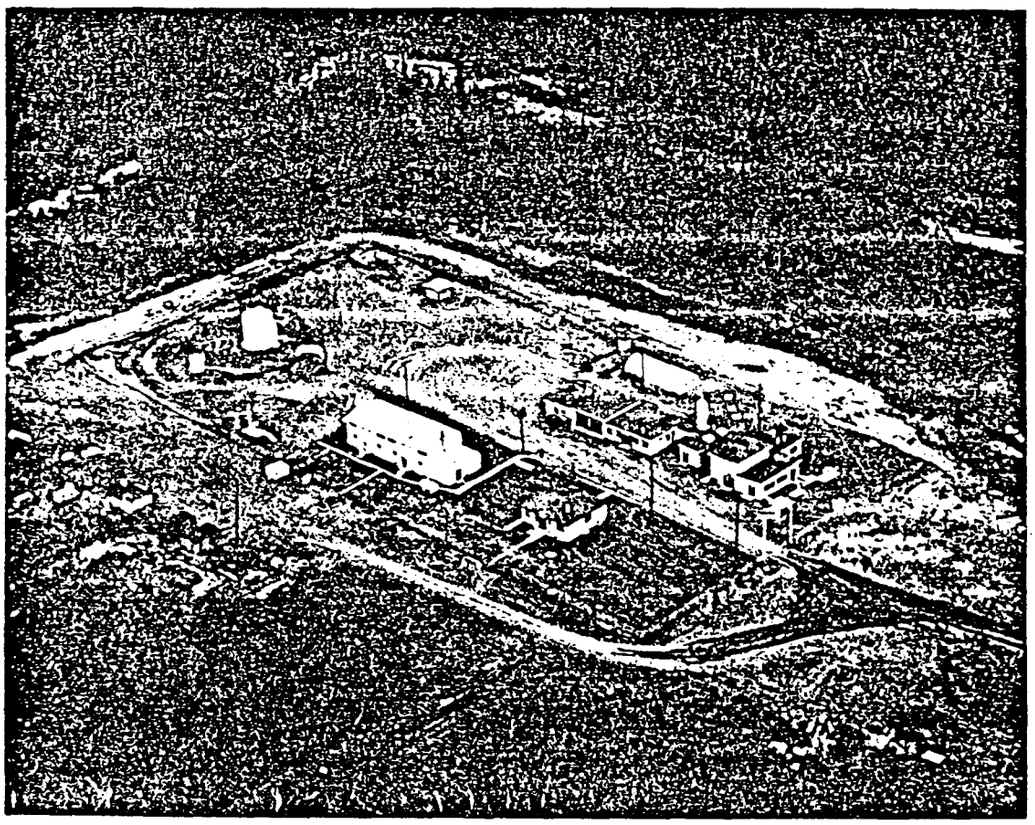
SECTION VIII

DONJEK PUMP STATION

1. GENERAL. Donjek Pump Station is approximately 25 miles northwest of the trading post of Burwash Landing, Yukon Territory, and approximately 500' north of the Alaska Highway, near Donjek River Bridge. The site is 248 pipeline miles from Haines Terminal at an elevation of 2,673' above sea level. The station area is approximately 5 acres.

2. FACILITIES. a. Mainline Pump Building.
   b. Utility Building.
   c. Family Housing.

3. MAINLINE PUMP BUILDING. This building is a single story structure consisting of an engine room, pump room and office. The office is isolated from the pump room by means of a pressure barrier fire wall and door arrangement, permitting the rooms to be pressurized excluding petroleum vapors from this area. The engine room is isolated from the pump room by a fire wall.



Donjek Pump Station, approximately 5 acres in area, is located 25 miles northwest of the trading post of Burwash Landing.

a. The pumping facilities at this station consist of two pumping units, each containing a Chicago Pneumatic Model CP-89, 8 cylinder, 4 cycle, diesel engine driving a Byron-Jackson centrifugal pump. The diesel engines are coupled to the pumps by means of a 4.750 to 1 geared speed increaser unit. Engine speed range is from 705 RPM to 805 RPM. Thus, the pump speed range is 3,349 RPM to 3,824 RPM. Maximum engine break horsepower is 425. The pumps may be operated individually or in series.

b. Two Moorlane strainers are also housed in the pump house. These strainers serve both as filters and water extractors for the petroleum products. A product sump outside the building is provided to accumulate the drain discharges from the strainers. Originally this product could not be pumped back into the pipeline. A pump has been installed to return the product to the line, and jet type strainers will replace the Moorlane strainers.

c. Scraper traps are located on each side of the building for receiving and launching scrapers through the pipeline.

d. Jacket cooling water is piped from the diesel engines to a 2-unit radiator building adjacent to the pump house and returned to engines.

e. Diesel fuel oil is provided from the 1,000-barrel station bulk storage tank. The tank is filled from the pipeline at scheduled intervals.

f. There is a 6-inch product by-pass which is valved in such a manner that products can be routed through or by-pass the station pumps.

4. UTILITY BUILDING. This is a multi-purpose building containing:

a. Engine room with two power units, each consisting of a Caterpillar Model D-13000 diesel engine driving a General Electric 480 volt, 60 cycle, 50 KW, 900 RPM generator. Radiators are mounted on the diesel engines.

b. A 5-man capacity bunk-room for visiting line maintenance personnel.

c. A garage-shop area.

d. Tool room.

e. A room housing a water pneumatic tank with a Peerless pump.

5. FAMILY HOUSING. Housing at this station consists of one permanent house and apartment.

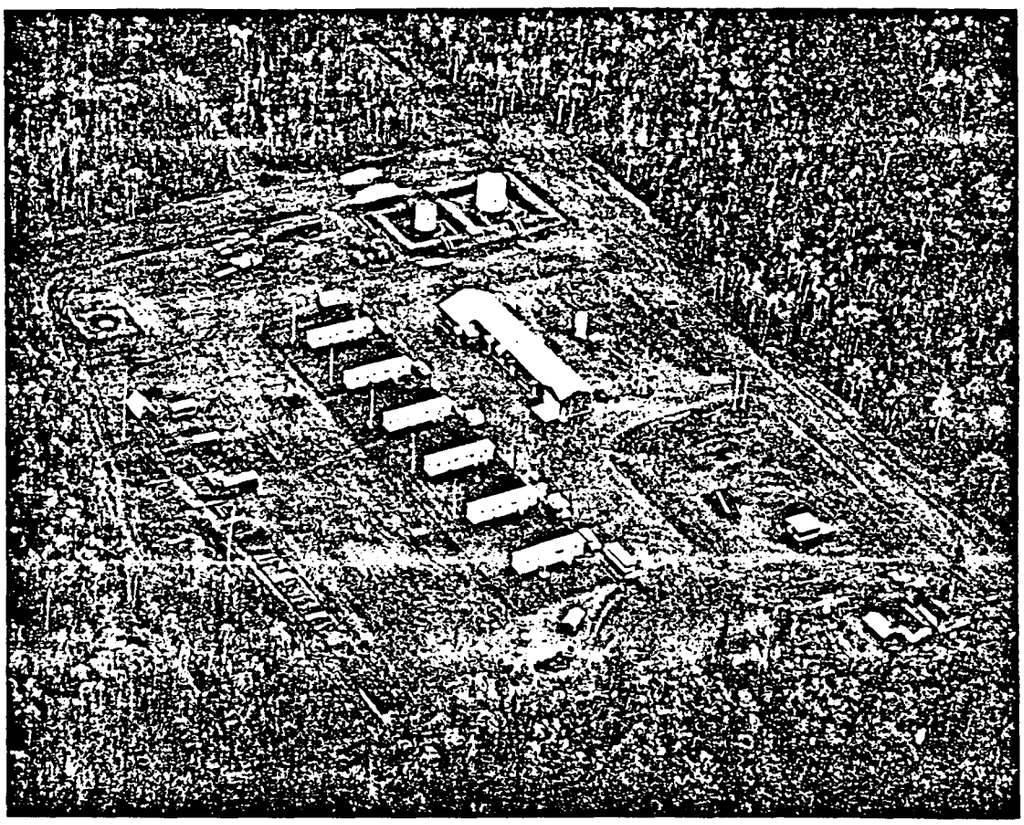
a. The permanent type house is a single family 3-bedroom unit for the Station Foreman, heated by a forced air, oil fired furnace.

b. An apartment building consisting of four 3-bedroom units, heated by a boiler located in the basement.

SECTION IX

BEAVER CREEK STATION

1. GENERAL. Beaver Creek Pump Station is located at Milepost 1204.2 on the Alaska Highway. The station area consists of 12.1 acres and is at an elevation of 2,100'.



Beaver Creek Pump Station, 12.1 acres in area, is located at Milepost 1204.2 on the Alaska Highway.

2. FACILITIES.

a. Combination Building.

b. Family Housing.

3. COMBINATION BUILDING. This building is a one story construction consisting of engine room, pump room, office, generator room and maintenance shop. The engine room is isolated from the rest of the shop by a fire wall.

a. The pumping facilities consist of two units each composed of a Chicago Pneumatic Model CP-69, 6 cylinder, 4 cycle, diesel engine driving a Bingham centrifugal pump. The diesel engines are coupled to the pumps by a means of a Western Gear speed increaser unit. Maximum engine horsepower is 300. The pumps may be operated individually or in series.

b. Two low pressure oil fired steam boilers and two 60 KW generators, which are powered by Caterpillar engines, are in the generator area.

4. FAMILY HOUSING. The housing facilities provided for these stations are comprised of six 10' by 50' trailers at each site. They are partially furnished and have steam heat piped in from the central heat plant. The utilities are furnished through an underground utilidor running from the utility building. Automatic heat controls are provided in each trailer.

SECTION X

LAKEVIEW PUMP STATION

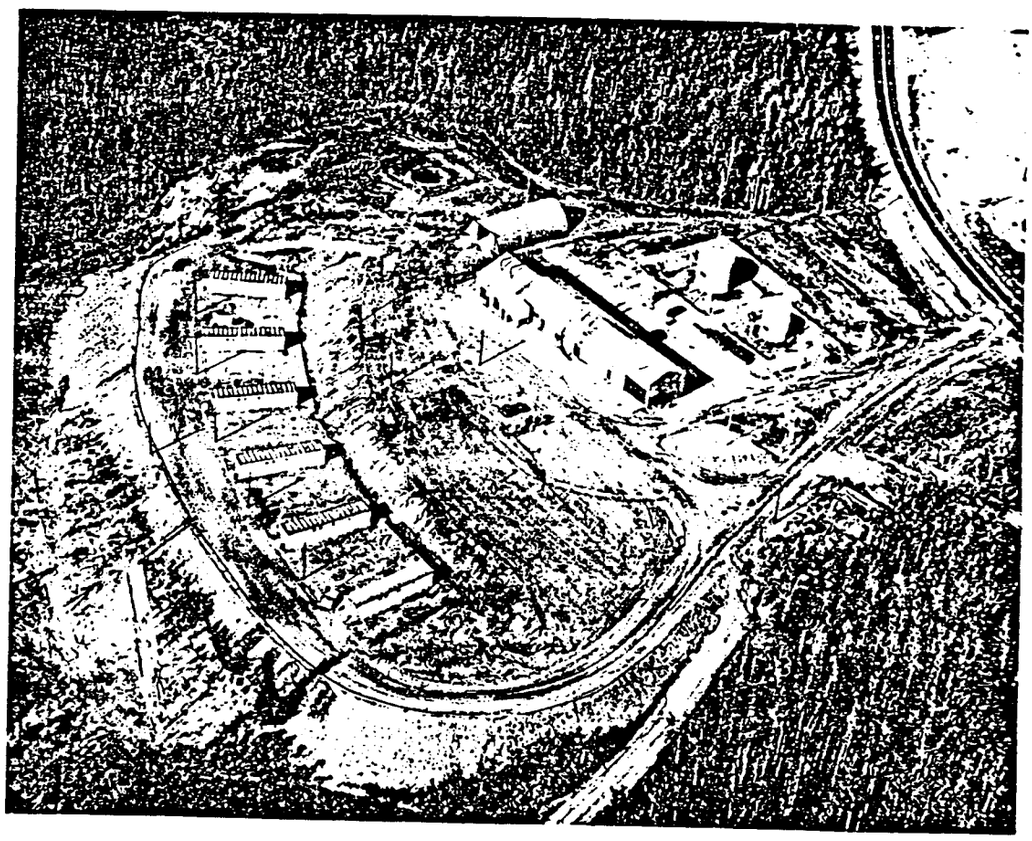
1. GENERAL. Lakeview Pump Station is located at Milepost 1256.4 on the Alaska Highway. The station area consists of 25.5 acres and is at an elevation of 1,740'.

2. FACILITIES.

a. Combination Building.

b. Family Housing.

3. COMBINATION BUILDING. This building is a one story construction consisting of engine room, pump room, office, generator room and maintenance shop. The engine room is isolated from the rest of the shop by a fire wall.



Lakeview Pump Station, 25.5 acres in area, is located at Milepost 1256.4 on the Alaska Highway.

a. The pumping facilities consist of two units, each composed of a Chicago Pneumatic Model CP-69, 6 cylinder, 4 cycle, diesel engine driving a Bingham centrifugal pump. The diesel engines are coupled to the pumps by a means of a Western Gear speed increaser unit. Maximum engine horsepower is 300. The pumps may be operated individually or in series.

b. Two low pressure oil fired steam boilers and two 60 KW generators, which are powered by Caterpillar engines, are in the generator area.

4. FAMILY HOUSING. The housing facilities provided for these stations are comprised of six 10' by 50' trailers at each site. They are partially furnished and have steam heat piped in from the central heat plant. The utilities are furnished through an underground utilidor running from the utility building. Automatic heat controls are provided in each trailer.

SECTION XVII

FAIRBANKS TERMINAL AND PUMP STATION

1. GENERAL. Fairbanks Terminal and pump station is the terminus for the 8-inch pipeline. The terminal is located approximately 7 miles northeast of Fairbanks, Alaska. The site, approximately 167 acres, is within security fence protection. This terminal is the thirteenth installation of the Haines/Fairbanks Pipeline.

2. FACILITIES.

a. Manifold Building.

b. Tank Farm.

c. Garage-Shop-Office Building.

d. Laboratory.

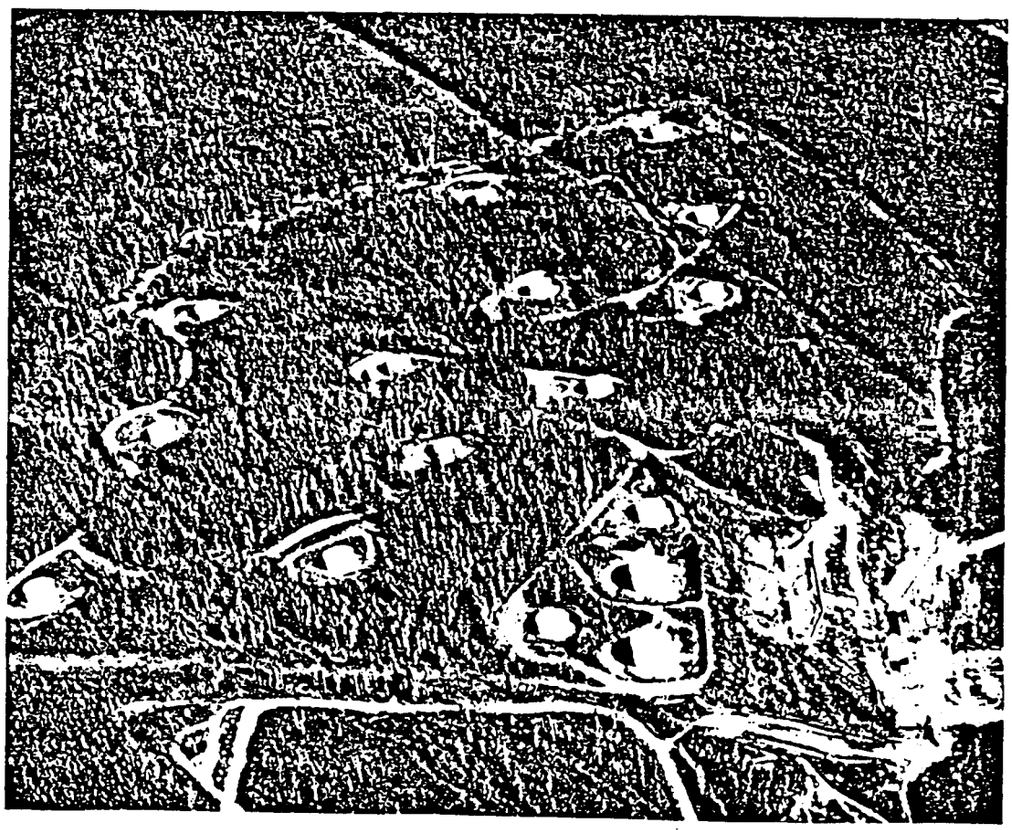
e. Storage Building.

f. Package Yard.

3. MANIFOLD BUILDING. This building contains flow meters and manifolding required to receive products from the 3-inch and 8-inch pipelines, and transfer to terminal storage tanks.

a. The elevation difference between the facility and the storage tanks varies from 40' to 160', with all tanks on different elevations.

b. Unlike other terminal storage areas, transfer of products between storage tanks, as well as delivery of products into Fort Wainwright transfer lines and manifold, can be accomplished entirely by gravity flow. To move product to either loading racks or into the mainline to "back-pump" to Eielson Air Force Base, two pumps driven by 75 HP electric motors are utilized. Four pumps driven by 25 HP electric motors can be utilized to transfer products to Fort Wainwright Quartermaster tanks, truck loading racks, or tank car filling stems. Scraper receiving trap is installed on the 8-inch pipeline. The building receives power at 480 volts, 3 phase, from an underground line.



Fairbanks Terminal and Pump Station, approximately 167 acres in area, is the terminus of the 8-inch pipeline and is located 7 miles northeast of Fairbanks, Alaska.

SECTION XV

BIRCH LAKE TANK FARM

GENERAL. Birch Lake Tank Farm is located at Milepost 305 on the Richardson Highway and has two tanks with a capacity of 6,600 barrels each. The area covered is approximately 2 acres. A 3-inch take-off line at pipeline Milepost 569 connects the two tanks. If it is necessary to evacuate the product, this can be accomplished by the use of an electrical pump.

There are two 3-inch lines; one from each tank, laid to a loading rack. It is possible to load more than one vehicle at a time by the use of the two loading stems. Electrical power is furnished by Golden Valley Electrical Company.

SECTION XVI

EIELSON TAKE-OFF STATION

1. GENERAL. Eielson Air Force Base Station, 27 miles south of Fairbanks Terminal, is located at Milepost 599. It is a take-off facility for delivery of products from the 8-inch line to the Eielson Air Force Base. Located within a restricted area on the base, the station site occupies approximately 1 acre.

2. MAINLINE TAKE-OFF FACILITY. This building is a single story 600 square feet structure divided into a communication (telephone and teletype) room and a manifold room with flow meters for measuring products. The manifold equipment is connected to the 8-inch main line by a 6-inch valved line. A pressure reducing valve reduces and controls the pressure of the product delivered to the Eielson tank to the tank farm. The station is also capable of sending or receiving scrapers.

3. ELECTRICAL FACILITIES. Electric power at 120/140 volts, single phase, is furnished by Eielson Air Force Base.

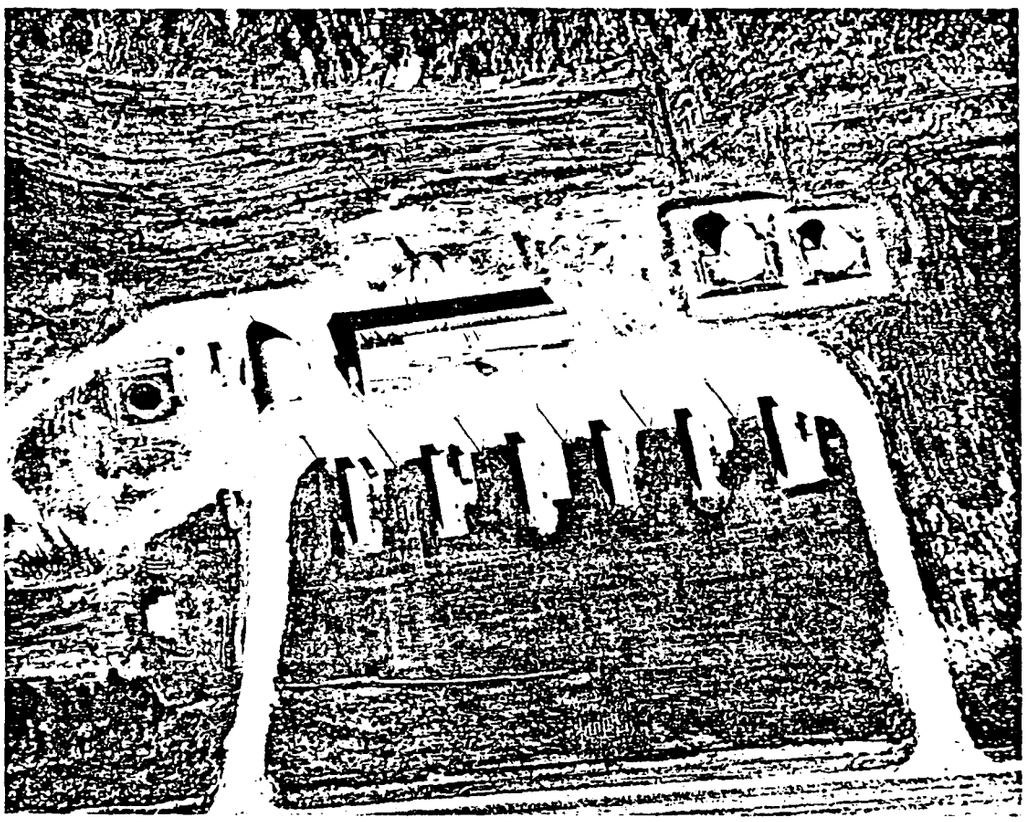
4. TANKAGE.

Tank Number	Capacity in Barrels
501-508	10,000
515-517	16,000
518	10,000
521	16,000
536-540	30,000
Total	82,000

SECTION XIV

TIMBER PUMP STATION

1. GENERAL. Timber Pump Station is located at Milepost 278 on the Richardson Highway. The station area consists of 20.4 acres and is at an elevation of 985'.



Timber Pump Station, 20.4 acres in area, is located at Milepost 278 on the Richardson Highway.

2. FACILITIES.

a. Combination Building.

b. Family Housing.

3. COMBINATION BUILDING. This building is a one story structure consisting of engine room, pump room, office, generator room and maintenance shop. The engine room is isolated from the rest of the shop by a fire wall.

a. The pumping facilities consist of two units, each composed of a Chicago Pneumatic Model CP-69, 6 cylinder, 4 cycle, diesel engine driving a Bingham centrifugal pump. The diesel engines are coupled to the pumps by a means of a Western Gear speed increaser unit. Maximum engine horsepower is 300. The pumps may be operated individually or in series.

b. Two low pressure oil fired steam boilers and two 60 KW generators which are powered by Caterpillar engines are in the generator area.

4. FAMILY HOUSING. The housing facilities provided for these stations are comprised of six 10' by 50' trailers at each site. They are partially furnished and have steam heat piped in from the central heat plant. The utilities are furnished through an underground utilidor running from the utility building. Automatic heat controls are provided in each trailer.

SECTION XIII

FORT GREELY

1. GENERAL. Fort Greely, which is located 99 miles north of Tok Terminal is comprised of a take-off facility for delivery of products from the 8-inch line to PDO tankage. On Fort Greely itself, PDO operates a bulk retail facility with two loading stems capable of loading diesel fuel and motor gasoline.

2. MAINLINE TAKE-OFF FACILITY. This building is a single story 600 square feet structure divided into a communication (telephone and teletype) room and a manifold room. Completely enclosed with chain-link fencing, the site occupies an area of approximately 1 acre.

a. The 8-inch pipeline runs adjacent to this building. A 6-inch, valved, take-off from this line routes the product through the building. Maximum delivery rates are: 8-inch line - 200 BPH of diesel fuel, 250 BPH of motor gasoline, 300 BPH of AvGas and 600 BPH jet fuel.

b. From the take-off station, two 4-inch lines run approximately 3,200' to a point on the Richardson Highway where they tie into two 3-inch lines leading to the storage tanks at Fort Greely.

c. Electric power at 120/140 volts, single phase, is provided by Golden Valley Electric Company.

3. TERMINAL TANKAGE AT FORT GREELY. Four 10,000-barrel steel, bolted and welded storage tanks number 481 through 484, originally a part of the Canol Pipeline System, are located at Fort Greely. Products are discharged from tankage by gravity flow operations. There are also two 15,000-barrel tanks for supplying the power house at Fort Greely, and two 2,250-barrel tanks.

4. TANK TRUCK LOADING FACILITIES. Facilities are available for loading of two products with a loading time of approximately 10 minutes.

5. PACKAGE PRODUCTS. All products used by Fort Greely are stocked and issued by PDO.

6. SOUTH TANK FARM. Facilities are available for loading two products with loading time of approximately 10 minutes.

SECTION XII

SEARS CREEK PUMP STATION

1. GENERAL. Sears Creek Pump Station is located at Milepost 1374 on the Alaska Highway. The station area consists of 9.8 acres and is at an elevation of 1,335'.

2. FACILITIES.

a. Combination Building.

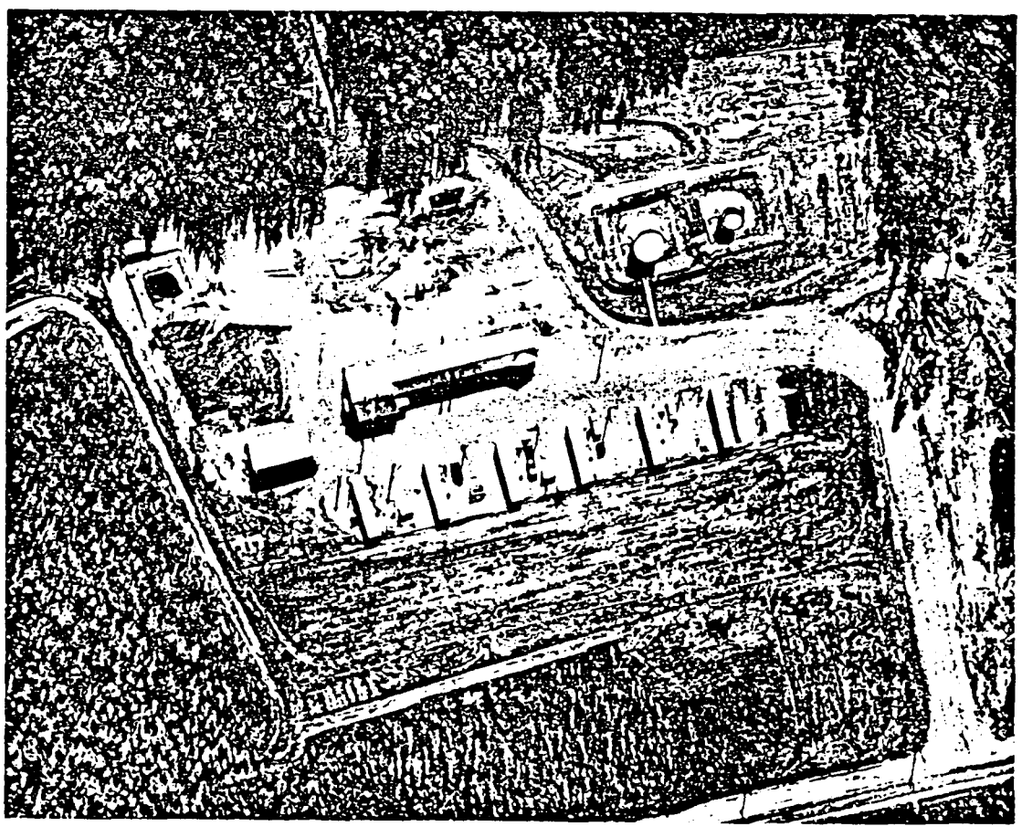
b. Family housing.

3. COMBINATION BUILDING. This building is a one story structure consisting of engine room, pump room, office, and generator room and maintenance shop. The engine room is isolated from the rest of the shop by a fire wall.

a. The pumping facilities consist of two units, each composed of a Chicago Pneumatic Model CP-69, 6 cylinder, 4 cycle, diesel engine driving a Bingham centrifugal pump. The diesel engines are coupled to the pumps by a means of a Western Gear speed increaser unit. Maximum engine horsepower is 300. The pumps may be operated individually or in series.

b. Two low pressure oil fired steam boilers are two 60 KW generators which are powered by Caterpillar engines are in the generator area.

4. FAMILY HOUSING. The housing facilities provided for these stations are comprised of six 10' by 50' trailers at each site. They are partially furnished and have steam heat piped in from the central heat plant. The utilities are furnished through an underground utilidor running from the utility building. Automatic heat controls are provided in each trailer.



Sears Creek Pump Station, 9.8 acres in area, is located at Milepost 1374 on the Alaska Highway.

e. The control room is isolated by means of a pressure barrier fire wall and door arrangement, which permits the control room to be pressurized for excluding petroleum vapors from this area. The engine room is isolated from the pump room by a fire wall.

f. Two jet strainers installed on the intake line are in parallel for alternate use when receiving product.

g. A product sump within the building is provided to accumulate drain discharges from the strainers. The product in the sump is disposed of by pumping into the line when appropriate.

h. Scraper traps are installed for receiving and sending scrapers through the 8-inch pipeline and for sending scrapers through the 3-inch pipeline.

6. UTILITY BUILDING. This building furnishes heat, electric power and water for the station. It houses three General Electric 480 volt, 60 cycle, 150 KW, 720 RPM generators driven by four Chicago Pneumatic, 6 cylinder, 4 cycle, 720 RPM, 285 HP, Model CP-69 diesel engines. Engine cooling water is pumped to a 3-unit radiator building and returned to the engines. Heat for the station is generated by three oil fired, 150 HP, low pressure (15 PSI) boilers. There is also a deep water well, a fire pump, two domestic water pumps and a water softener unit for boilers, and the diesel radiator cooling systems in the utility building.

7. MAINTENANCE AND SERVICES BUILDING. This structure is a Butler type building with 6,400 square feet of floor space, housing the machine, carpenter and plumbing shops, heavy equipment maintenance shops, petroleum laboratory, office space, square parts and general storage.

8. WAREHOUSE-GARAGE-SHOP BUILDING. This is a multi-purpose building containing:

a. A 4-door garage for storage of assigned vehicles and equipment.

b. A shop for automotive repair and general maintenance.

c. Office, tools and parts storage, and a toilet.

d. Warehouse consisting of approximately 1,500 square feet of space containing bins for storage of small, fast moving items.

9. WATER TANK BUILDING. This building houses a 130,000-gallon water storage tank, providing water for both domestic use and fire protection.

10. TRUCK LOADING RACK. This facility is of steel frame construction on a concrete foundation, a metal roof and wood plank floor decking with two 3-inch headers, one for diesel fuel and one for motor gasoline.

11. FAMILY HOUSING. Housing at this station consists of permanent type building. Permanent type buildings are of wood frame construction, foundations and basements are concrete, and the roofs are insulated wood decking with a built-up composition roof and gravel protective coating. The buildings include the following:

a. One dormitory (CBQ) with a capacity of ten men including a dining room, kitchen and bath.

b. One apartment type building consisting of four 3-bedroom units.

c. One apartment type building consisting of eight 2-bedroom units.

12. COLD STORAGE LOCKER BUILDING. This is a concrete building with a freeze room (-10°F), which is equipped with individual food lockers.

13. INCINERATOR. Fired by a diesel oil burner, the incinerator is suitable for burning rubbish and garbage under all weather conditions.

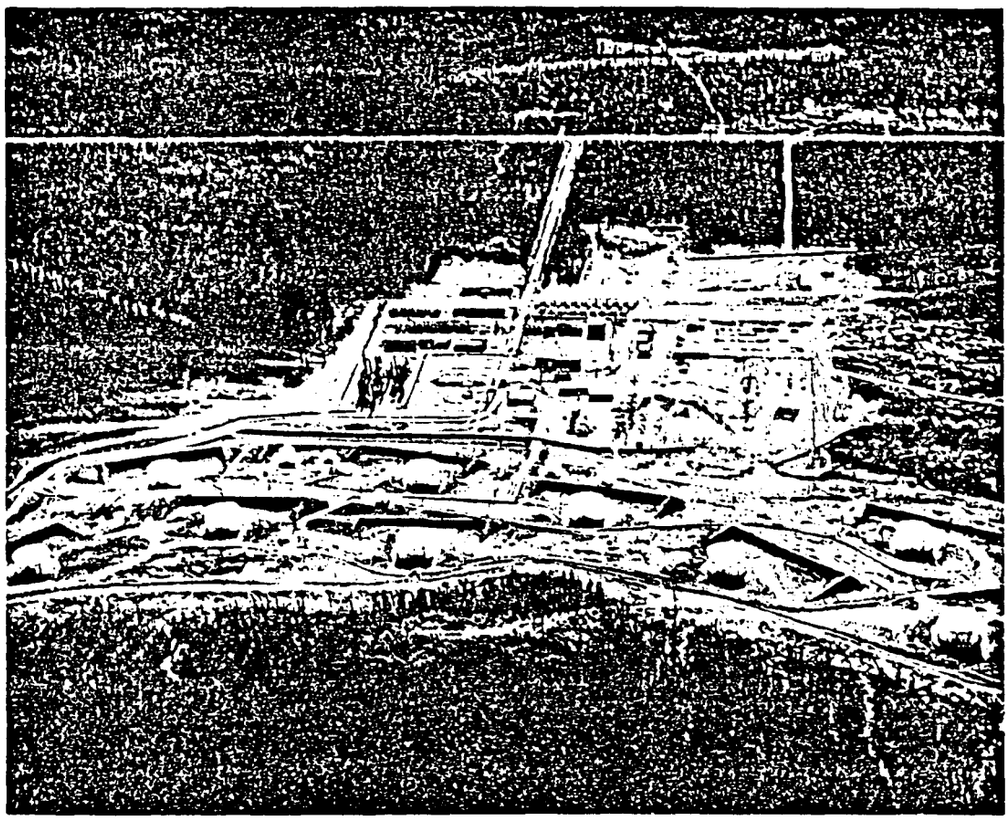
14. STORAGE BUILDING (SEMI-PERMANENT). This building was erected by the contractor. It is located outside the fenced area and is being used for storage of miscellaneous supplies. Planned modifications will convert this structure to a storage-recreation-launderette building.

The fire foam building is situated within the tank farm area with a network of lines for fire fighting purposes. Each tank has a mechanical fire foam nozzle fed from a pipe connected to the system.

Floodlights on wood power-line poles are provided for tank farm lighting.

5. MAINLINE PUMP BUILDING. This building is control center of operations with a dual function of receiving products from the Haines-Tok section of the 8-inch line and all north pumping movements. The building is divided into a control room, an engine room and a pump room.

a. The 8-inch pumping equipment includes 3 main line reciprocating pumping units, each consisting of a Chicago Pneumatic Model CP-69, 6 cylinder, 4 cycle, 720-420 RPM, 285 HP diesel engine driving a Wilson-Snyder quintuplex plunger pump rated at 272 GPM, 120-70 RPM, 1200 PSI discharge pressure. Each engine and pump unit is connected by a 6 to 1 gear reduction unit. Each unit will operate individually or in parallel. Maximum station pumping capacity on the main line is 1,167 BPH with the pumps connected in parallel.



Tok Terminal and Pump Station, 127 acres in area, is located 7 miles north of Tok Junction, Alaska.

b. The 3-inch pumping equipment includes 2 main line reciprocating pumping units, each consisting of a Caterpillar Model D-8800, diesel-powered, 4 cycle, 1000 RPM, 70 HP engine driving a Wilson-Snyder triplex reciprocating pump with a constant speed of 90 RPM for pumping 45 GPM, 1,420 PSI discharge pressure. Each engine and pump unit is connected by a 2.23 to 1 gear reduction unit; a further reduction in speed is obtained from a 4.44 to 1 ratio gear unit built into the pumps. Units are not operated in parallel; each unit is alternately utilized for pumping operations.

c. Diesel fuel oil is supplied to pump engines from a 1200-gallon station day tank supplied from bulk storage tanks.

d. Engine coolant water is piped from the diesel engines to a 5-unit radiator building near-by and returned to the engines.

SECTION XI

TOK TERMINAL AND PUMP STATION

1. GENERAL. Tok Terminal and Pump Station, 7 miles north of Tok Junction, Alaska, and 95 miles north of the Canadian-Alaskan Border, is the ninth installation of the Haines/Fairbanks Pipeline (Milepost 432). The Haines-Tok section of the Haines/Fairbanks Pipeline terminates at this installation. Tok Terminal tankage is utilized as "regulating tankage." All batches are taken into tankage, rescheduled and pumped to receiving stations north of Tok. This tankage also permits water and solid matter to settle out of the products prior to rescheduling. The terminal site is an area of approximately 127 acres with all permanent facilities enclosed by chain-link fencing.

2. FACILITIES.

a. Manifold Building.

b. Tank Farm.

c. Mainline Pump Building.

d. Utility Building.

e. Maintenance and Services Building.

f. Warehouse-Garage-Shop Building.

g. Water Tank Building.

h. Truck Loading Rack.

i. Family Housing.

j. Cold Storage Locker Building.

k. Incinerator.

l. Storage Building (Semi-permanent).

3. MANIFOLD BUILDING. This building houses the manifold piping and valves required to route products from the 8-inch pipelines to terminal storage tanks - from terminal storage tanks through water separators (three Warner-Lewis Separators - two for 8-inch line operations, and one for 3-inch line operation) to the mainline pump building. Three transfer pumps are provided for transfer of products between storage tanks and to station tanks.

a. Three product lines, extending from the manifold to pump building, consist of an 8-inch line for receiving products for the main line, an 8-inch suction line to the main line pumps, and a 3-inch line for pumping products to the 3-inch line.

b. Elevation difference between the terminal storage tanks and the manifold pump buildings varies from 60' to 125'. Tank elevation measured at grade level varies from 1,636' to 1,733'.

4. TANK FARM. The tank farm, a fenced area north of the terminal buildings, contains 13 product tanks; 12 for products to be transported through the line, and one for station fuel. The tank numbers and capacities are as follows:

Tank Number	Capacity in Barrels
217-225	30,000 Each
226-227	5,000 Each
228	5,000 Each
229	1,000 (For Station Use Only)

Each 30,000-barrel tank is equipped with a swing line 40-feet long for filling and withdrawing product. Water removal is accomplished by gravity flow from the center sump on each tank. A 4-inch line runs from the central water draw-off sump to a drain just outside the tank. Water draw-off operations are manually controlled by a gate valve just outside the tank.

The tank farm is situated on a hillside with each tank surrounded by a dike of sufficient capacity to contain 150% of the tank capacity. A ditch and dike are also provided across the south side of the tank farm to protect the station buildings from rain water or product overflow. A road in the tank farm area provides access to all tanks.

4. TANK FARM. a. The tank farm area is north of the manifold building. Tankage consists of 29 steel, bolted and welded tanks. Twenty-seven tanks are utilized for storing products received from the mainline, with two tanks for station use.

b. The manifold building is connected by product lines to designated tanks. The same lines are utilized for delivering to Fort Wainwright manifolding transfer system. The tanks and capacities are as follows:

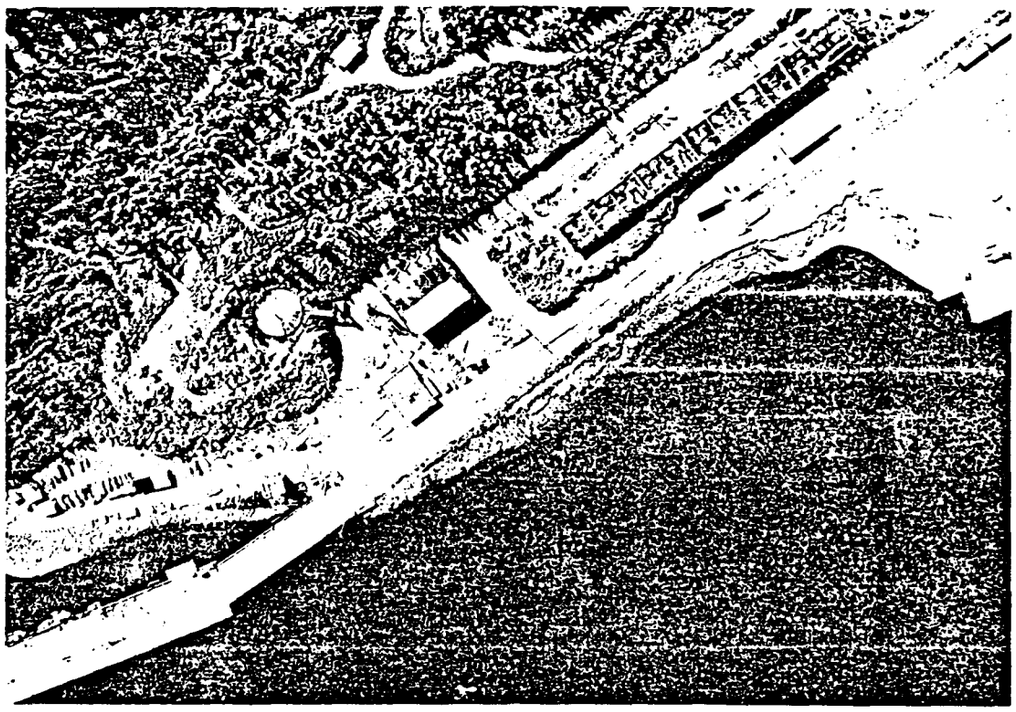
TANKS	CAPACITY	TOTAL
2	25,000 BBLS	50,000
14	10,000 BBLS	140,000
4	2,250	9,000
3	1,190	3,570
4	595	2,380

SECTION XVIII

WHITTIER/ANCHORAGE PIPELINE FACILITIES AND OPERATION

1. GENERAL DESCRIPTION. The Whittier/Anchorage pipeline was constructed to transport liquid fuels from the all weather port of Whittier to the Port of Anchorage which is inaccessible at certain times of the year. The system is installed for ease of expansion to a larger capacity in the future by the addition of pumping units at Whittier and Indian. The line is composed of 61.7 miles of 8-inch pipeline, one booster station at Indian Creek and a pressure reducing station at Chugach, approximately 50 miles from Whittier.

2. DESIGN AND CONSTRUCTION. The design of the pipeline was accomplished for the Corps of Engineers by Mullens and Dravo Corporation, and was constructed under the supervision of the US Army Corps of Engineers, Fort Richardson, Alaska. Total cost of the pipeline was $12,684,090 and was completed in the fall of 1967.



POL Dock, Whittier, Alaska, can hold up to a T-5 super tanker. The structure is fitted with four 8-inch product hose connections that are manifolded into two 12-inch unloading pipelines at the dockside.

3. ROUTE. The pipeline originates at Whittier, Alaska. Shortly after leaving the Whittier Pump Station, it is routed through a mountain tunnel approximately 13,200 feet long, across Bear Valley, skirts Portage Lake and follows close to the Turnagain Arm Shore Line for a total distance of approximately 34 miles to Indian Booster Station. The product is boosted from Indian Booster Station over 3600 feet of elevation (approximately 38 miles from Whittier). It continues from this peak to Chugach Pressure Reducing Station (approximately 50 miles from Whittier) and on through Fort Richardson and Elmendorf Air Force Base to Anchorage Metering Station, which is located in the ocean dock area of Anchorage.

4. PROFILE. Sixty-one and seven tenths miles extend from Whittier, Alaska, (elevation 42 feet) to Anchorage, Alaska, (elevation 117 feet) with a high peak elevation of 3600 feet and about 38 miles from Whittier.

5. MULTI-PRODUCT PIPELINE. Currently the four products which are transported through the Whittier/Anchorage Pipeline are:

a. Aircraft turbine and jet engine fuel, grade JP4.

b. Diesel fuel, grade DFA.

c. Automotive combat gasoline, grade 950.

d. Aviation gasoline, grade 115/145.

6. TANKAGE.

Station	No. of Tanks	Normal Barrels Per Tank		Total Capacity Barrels
Whittier	8	27,500		220,000
	1	55,000		55,000
			TOTAL	275,000
Anchorage	4	50,000		200,000
	4	11,000		44,000
	4	9,530		38,120
	4	14,000		56,000
	1	20,000		20,000
			TOTAL	358,120
Elmendorf AFB	29	1,190		34,510
	8	25,000		200,000
	2	20,000		40,000
			TOTAL	274,510

7. DESIGN CAPACITY.

a. Normal. The normal design capacity of the pipeline is 24,000 BPD of JP4 jet fuel at a temperature of minus 20°F and a pressure of less than 1440 psig. The design capacities are based on JP4 jet fuel with the capacities of other products falling where they may.

b. Maximum. The maximum design capacity of the pipeline is 30,850 PSD of JP4 jet fuel at a temperature of minus 20°F and a pressure of 1440 psig at the Indian Booster Pump Station. This limitation is caused by the maximum working pressure of the 600 pound ASA valves and flanges in the system rather than the pump output. This rating was dictated by the pipe wall thickness.

c. Minimum. The minimum design capacity of the pipeline is 12,000 BPD of JP4 jet fuel at a temperature of minus 20°F and a pressure less than 1440 psig at both pump stations.

8. CALCULATED CAPACITIES.

NO PUMPS OPERATING		CAPACITY - BPD	
Whittier	Indian	JP4	Diesel
2	2	30,850	28,114
1	2	23,500	19,500
2	1	24,860	21,600
1	1	12,000	11,315
2	0	10,286	7,200

The above capacities are based on the viscosity and specific gravity at - 20°F.

SECTION XIX

WHITTIER TERMINAL AND PUMP STATION

1. GENERAL. Whittier Terminal and Pump Station, 85 acres in area, is located through the Wells Passage in Price William Sound.

2. FACILITIES.

a. POL dock (holds up to a T-5 super tanker).

b. Tank farm (9 tanks with a total capacity of 275,000 bbls).

c. Tank car loading racks (two each, with a capability of loading 30 cars at a time).

d. Fire equipment building (contains two electric driven turbine pumps, 100 hp, 1000 gallons per minute).

e. Pump house (two prime movers, cat D-379, 400 hp, two jet strainers).

f. Transfer building (two 100 hp electric driven pumps supply suction pressure to mainline pumps when line is in operation).

g. Maintenance shop (capable of doing major and minor overhauls of all equipment.

h. Housing (Hodge Building - 3 floors).

i. [illegible]g.

3. POL DOCK.

a. The dock is an unloading structure fitted with four 8-inch product hose connections that are manifold into two 12-inch unloading pipelines at the dockside.

b. Pipelines. Two 12-inch nominal diameter pipelines run from the dock manifold to a manifold house about one third of the way to the transfer pump plant. Four 12-inch lines leave the manifold house and immediately tie into four existing 12-inch lines which run to the transfer pump plant.

4. TANKAGE. The existing tankage consists of eight tanks for the storage of jet fuel and gasolines. These tanks are manifold at the existing transfer pumphouse and the existing manifold. Each tank is 70 feet in diameter by 40 feet high with a capacity of 27,420 barrels.

a. New Tankage. A tank 107 feet in diameter by 40 feet high with a capacity of 55,000 barrels is installed for diesel fuel storage and will be connected to the manifold at the manifold building.

b. Level Indicators. All tanks have Shand & Jurs transmitters installed on the ground reading level guages for remote reading of the tank level on a Shand & Jurs console in the control room of the mainline pump station. The remote level reading will be the selector type which reads the level in one tank at a time by selection of the operator. No alarms are provided for low or high level.

5. TANK CAR LOADING RACKS. There are presently two tank car loading racks, located near the tank farm, with the capability of loading approximately 30 cars at a time.

6. FIRE EQUIPMENT BUILDING. The fire equipment building is of metal construction with concrete floor. Installed in this building are two steam operated deep well pumps, one electric operated pump and one gasoline operated pump, with two sets of manifolding. One set of piping is for salt water fire system and the other is for fresh water that supplies the boiler coolers.

7. MAINLINE PUMP STATION.

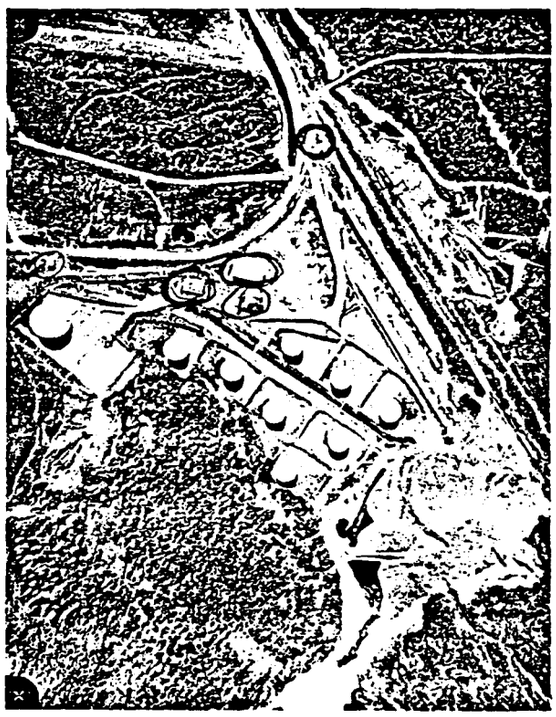
a. Mainline Pumps. The mainline pumps are United Y3X9WMSN-H horizontal centrifugal pumps driven by a Caterpillar D379 diesel engine through a Lufkin speed increaser. Two pumps are installed with space provided for two additional pumps in the future. The pumps are arranged such that they operate in series when more than one pump is in operation. The pumps take suction from the jet strainers and discharge to the main pipeline. Both systems can be used in conjunction with each other to accomodate assistance in all fire fighting.

b. Jet Strainers. Two Thornhill-Graver jet strainers are installed in the suction line to the mainline pumps with space left for the installation of a third unit in the future. Each strainer has its own panel with a differential pressure recorder and high differential pressure alarm. All of the installed strainers have a common auxiliary pump for backwash and cleaning. The backwash fluid is piped to the sump tank.

8. TRANSFER PUMP PLANT.

a. Two United Y4X11VP vertical in-line pumps with 100 hp General Electric motor drivers are housed in a concrete block building with provisions made for the installation of a third pump in the future. A sump tank and sump pump are installed in the building to collect drainage from pumps, the existing pump house and from the loading line to pump to a truck hose connection outside the building.

b. Manifolding. The manifold for the pumps is housed in an extension to the existing manifold building. The new manifold is valved with Hamer double line blind gate valves to prevent contamination. The manifold is valved so any product from any storage tank can be pumped to the pipeline.



Whittier Tank Farm, located through the Wells Passage in Prince William Sound, contains nine tanks with a total capacity of 275,000 barrels.

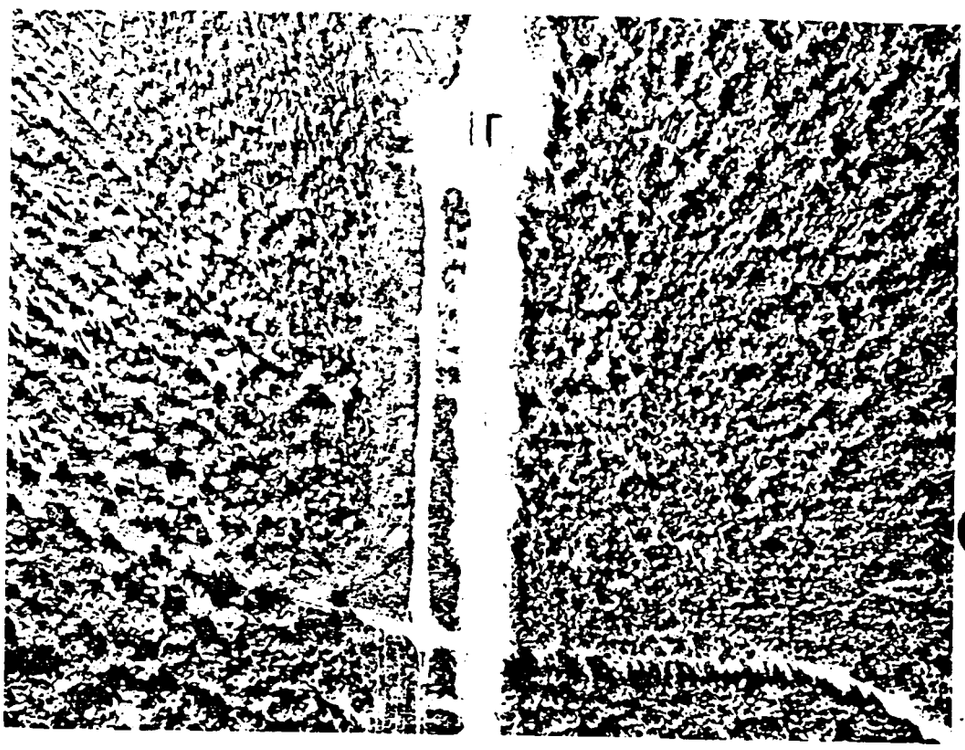
9. MAINTENANCE SHOP. The maintenance shop is a composite shop of 66,000 square feet utilized for storage (warm and cold), maintenance and repair of all types of mobile equipment. Contained in this building is a machine shop, carpenter shop, welding shop and lubrication facilities. It also contains a multiple crane installed for handling any and all types of components. Currently, 16,000 square feet are heated and utilized as a maintenance shop. The remainder is used as cold storage space for vehicles and equipment.

10. HOUSING. Family housing at Whittier has been provided through the renovation of three floors of the 14 story Hodge Building abandoned by the Army in 1958. Presently, there are 24 apartments and 39 BQ's available in this building. Also contained in this building is a school room, post office, recreation rooms and hobby shop. A walk-in freezer is located in the basement providing a large storage capacity for perishable foods.

SECTION XX

CHUGACH PRESSURE REDUCING STATION

1. GENERAL DESCRIPTION. When product is pumped over the mountain peak of 3600 foot elevation, the line drops to an elevation of 420 feet. Located here is the Chugach Pressure Reducing Station. As product flows through the line it is routed through the automatic pressure reducing control system so that pressure is reduced to a maximum of 600 pounds for its continuance through Fort Richardson, Elmendorf and Anchorage Terminal.



2. FACILITIES. Three restriction loops arranged in series and two control valves in series arranged so the flow can be directed through the required restriction loop.

a. One loop of 3-inch high-pressure pipe with a total length of 700 feet.

b. One loop of 3-inch high-pressure pipe with a total length of 330 feet.

c. One loop of 3-inch high-pressure pipe with a length of 1545 feet.

d. Three Rockwell Pressure Control Valves arranged so that when there is a scraper in the line the pressure reduction control system can be by-passed, allowing the scraper to go through to the station.

SECTION XXI

INDIAN CREEK BOOSTER STATION

1. GENERAL. The Indian Creek Booster Station is located approximately 26 miles south of Anchorage on the Seward Highway. This is a remote station and is operated by control panel from the Dispatcher's Office at Headquarters, Petroleum Distribution Office. The station boosts fuel over 3600 feet of elevation, highest on the Whittier/Anchorage line.

2. FACILITIES. Mainline Pump Building.

3. MAINLINE PUMP BUILDING. The mainline pump building is a single story metal building containing pump room, electrical equipment room and office. Since the pumps are operated by remote control, there are no personnel working in this building. The building is completely fire proof and is secured by a 6 foot cyclone fence.

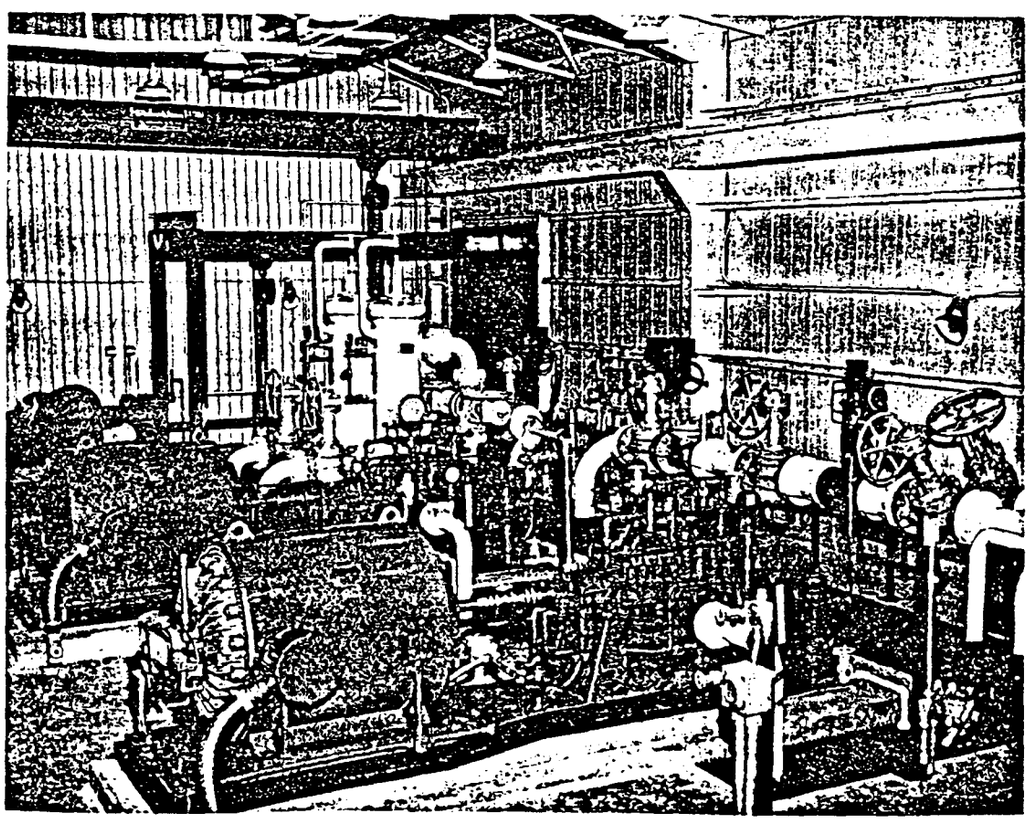
a. The mainline pumps are United horizontal centrifugal pumps driven by 400 hp General Electric electric motors through a flexible coupling. Two pumps are installed with space provided for two additional pumps in the future. The pumps are arranged such that they operate in series when more than one pump is in operation. The pumps take suction from the strainers and discharge to the main pipeline.

b. Two strainers are installed in the suction line to the mainline pumps and they take suction from main pipeline ahead of the station bypass check valve. Each strainer is provided with a differential pressure indicator.

c. A recording gravitometer is installed on the main pipeline to determine the gravity of any product flowing in the line. This system consists of a circulating pump, a flow indicator and the gravitometer. The system discharges back into the main pipeline.

d. The Indian Creek Booster Station is supplied with 2400 volt, 3 phase, 60 cys power by the Chugach Electric Company which has provided an alternate source of supply in case of failure.

e. The fire alarm system is a failsafe, low voltage battery operated system consisting of a control unit which automatically responds to the operation of the fire detectors (rate of rise and fixed temperature) or manual stations located throughout the station and rings the fire alarm,



Indian Creek Booster Station, using United horizontal centrifugal pumps, boosts fuel over 3600 feet of elevation, highest on the Whittier/Anchorage line.

bell or gongs in the building until manually reset. It will also cause a "fire" signal to be transmitted to the Fort Richardson Control Center via supervisory equipment and actuate a point on the annunciator on the graphic flow panel.

f. The control system consists of a graphic flow panel, protective devices on the pumps and motors and pushbutton controls at the equipment.

(1) The graphic flow panel consists of the following: (a) An annunciator which provides visual and audible alarms for station and unit malfunctions. (b) A mimic flow diagram with indicating lights which show status of valves and pump units. (c) An emergency stop pushbutton. (d) A station selector switch which permits station operation on either station remote sequence, station local sequence or station non-sequence. (e) Unit selector switch whose operation corresponds to that of the station selector switch. (f) Two pen recorders which record suction and discharge pressure, specific gravity and product temperature. (g) Pushbutton switches which control operation of pump units and electric motor operated valve.

(2) Individual equipment has its own start stop controls and protective devices. Each pump unit has its own control panel which contains the following protective devices: (a) Motor bearing high temperature. (b) Motor stator high temperature. (c) Pump bearing high temperature. (d) Pump case high temperature. (e) Pump seal leakage. (f) Pump excessive vibration. (g) Low suction pressure. (h) High discharge pressure.

g. The pump control panel on malfunction of one of the above items provides a unit mechanical failure signal, sounds an alarm and actuates an annunciator alarm point. It also provides a horn silence control and a light indicating the specific malfunction. The supervisory system consists of the necessary equipment to control and protect the station and is tied via wire line and microwave in full duplex system with the control center at Fort Richardson. Also connected into this system is the telemetering of the station suction and discharge pressure, specific gravity and the product temperature.

SECTION XXII

ANCHORAGE POL TERMINAL

1. GENERAL. The Anchorage POL Terminal consists of two sites: Area #1, 52 acres in area, located north of the City of Anchorage and Area #2, 228 acres in area, located on Elmendorf AFB, 1 mile northeast of Area #1.

2. FACILITIES.

a. Product Pipelines.

b. Sample House (Portable).

c. Manifolds.

d. Tank Farms.

e. Pump Stations.

f. Tank Car Loading Rack.

g. Tank Car Unloading Rack.

h. Communications.

3. PIER. The dock at the Port of Anchorage is owned and operated by the City and is located 1 mile north, extending due north into Knik Arms. It is capable of mooring tankers up to 26,000 DWT. This is a temporary structure which was constructed after the earthquake, and it is possible to unload only two products at a time.

4. PRODUCT PIPELINES. The following pipelines are available for discharging cargo to shore tankage:

a. Twelve-inch line for discharging jet fuel to Tank Farm #2.

b. Ten-inch line for discharging aviation gasoline, 115/145, to Elmendorf AFB terminal tankage.

c. Ten-inch line for discharging diesel fuel to Tank Farm #1.

d. Ten-inch line for discharging jet fuel and motor gasoline to Tank Farm #1.

e. Six-inch line for discharging diesel fuel to Tank Farm #1. This line is in standby status.

5. SAMPLE HOUSE (PORTABLE). Facilities are available for taking line samples of incoming product received from tankers through the 12 inch line and the three 10-inch lines. A sample house located adjacent to these lines contains the following:

a. Sample trough connected by small lines to each pipeline.

b. Table and explosion-proof light fixtures and heater.

6. MANIFOLDS. A central manifold system is not utilized at this terminal. As noted in paragraph 4, all lines with one exception are single product lines which eliminate the need for a central manifold. Each tanker discharge line is manifolded to the group of tanks it serves. Product transfer lines are manifolded from storage tanks through applicable pump houses by means of simple switching manifolds.

7. TANK FARMS. The Anchorage/Elmendorf Terminal tankage is located in two areas designated as Area #1 and Area #2.

a. Area #1 is the main terminal containing seventeen aboveground and underground storage tanks. The tanks and capacities are as follows:

Tank Number	Capacity in Barrels
611-614	9,530
★621-624	11,000
605-608	13,990
609	20,000
★616-619	50,000

★Underground tanks

Each of the aboveground storage tanks and the 11,000-barrel underground tanks have a single pipeline for receiving and discharging product. These lines, ranging from 6 to 10 inches, are manifolded so that product may be received directly from the dock or tank car unloading facilities. Product is transferred from these tanks utilizing the same lines. Each tank is equipped with a gauge hatch, pressure-vacuum or gooseneck vent and a water draw-off line.

Each 50,000-barrel tank has a 10-inch pipeline for receiving product directly, from the dock or tank car unloading facility and a 6-inch pipeline for discharging product. Discharge is through two deep well centrifugal pumps mounted in a pump house on each tank. Water draw-off is accomplished by means of a deep well centrifugal pump mounted in a pit at the top of the tank and extending into a sump located in the center of the tank bottom.

b. Area #2 is located on Elmendorf Air Force Base and contains four underground storage tanks, each having a capacity of 25,000 barrels. There are also 29 underground storage tanks each having a capacity of 1,200 barrels and four aboveground storage tanks each having a capacity of 25,000 barrels. Each 25,000 barrel underground tank has three pits equipped as follows:

(1) Main pump pit with an electrically driver, 900 GPM pump, a 6-inch suction line, gauge hatch, pressure-vaccum vent and manifolding permitting movement of product to Elmendorf Air Force Base or Area #1 tankage.

(2) Sump pump pit with sump pump and water draw-off line.

(3) Fill pit with top and bottom 6-inch fill lines. The tanks are situated in the form of a square and are looped on the inside and outside by a piping system with two connecting lines to each tank.

(4) The outside circle of 6-inch piping is for receiving product from dock discharge vicinity via the pump house or tank car loading rack via #2 and #5 pump houses.

(5) The inside circle of 6-inch piping is for discharging product to Elmendorf Air Force Base tankage.

Each of the twenty-nine 1,200-barrel tanks is filled by a 10-inch line originating at the POL Dock. These tanks are used primarily as back-up storage.

Each of the four 25,000-barrel tanks are filled by a 10-inch line originating at the POL Dock. Fuel from these tanks can be distributed by gravity flow to the operation tanks along the runway at Elmendorf Air Force Base and to the tank car loading rack located at the Anchorage Terminal.

8. PUMP STATION. Four pump stations are utilized in terminal operations:

a. Pump House #1. Located in Area #1 and is a combination concret and frame building, including an office, personnel locker room, power room and pump/manifold room. The latter two rooms are separated by a fire wall. The pump house contains the following equipment:

(1) Pumping Units: Eight Fairbanks-Morse pumps driven by Fairbanks-Morse, 220/440 volt, 60 cycle, 3,500 RPM electric motors, and 2 Gorman-Rupp pumps driven by General Electric, 220/440 volts, 60 cycle, 1,760 RPM electric motors. Under normal operations, units are operated individually with a capacity of 10,000 to 15,000 GPH; however, units operating in parallel will produce up to 20,000 GPH.

(2) A CO_2 automatic fire fighting system is installed in the pump room, consisting of a piping system connected to a CO_2 supply and spray nozzle. The system is activated by the action of heat on a temperature sensitive wire installed on the ceiling, and the alarm is automatically relayed to the fire station.

(3) Emergency electric power is furnished by a diesel powered generator with a Caterpillar, model D-17000, 927 RPM, 173 HP diesel engine and a Lewis-Allin, 208 volt, 800 RPM, 60 cycle, 96 KW, electric generator.

b. Pump House #2. Located in Area #1 and is utilized for discharging aviation gasoline from tank cars to Elmendorf Air Force Base tankage, and jet fuel from tank cars or tankage in Area #1 to tankage in Area #2. The pump house contains two Gorman-Rupp pumps driven by General Electric 220/440 volt, 60 cycle, 1,760 RPM electric motors. When using pump house #4 as a booster pump station, these units have a capacity of approximately 20,000 GPH. Not in use due to the earthquake.

c. Pump House #3. Located in Area #1 and is a brick structure utilized to transfer product to Elmendorf Air Force Base tankage. The pump house contains the following equipment:

(1) Two Pacific Packing Company pumps rated at 250 GPM against a 220-foot head and driven by a Westinghouse 220/440 volt, 60 cycle, 3,500 RPM, 20 HP electric motor; and two Pacific Packing Company pumps rated at 150 GPM against a 350 foot head and driven by Westinghouse 220/440 volt, 60 cycle, 3,540 RPM, 25 HP electric motors.

(2) A CO_2 automatic fire fighting system is installed in the pump room, consisting of a piping system connected to a CO_2 supply and spray nozzle. The system is activated by the action of heat on a temperature sensitive wire installed on the ceiling, and the alarm is automatically relayed to the fire station.

d. Pump House #4 (Multi-Product). Located 1 mile northeast of the pier on the 10-inch aviation gasoline line and the 12-inch jet fuel line to Elmendorf Air Force Base. The building is of concrete and steel structure. The pump house contains the following equipment:

(1) Surge Tank: One 750 gallon surge tank equipped with automatic and manual air relief valves, pressure switch for control of pump motors, pressure gauge and drain valve.

(2) Strainer: The Outlet nozzle of the surge tanks is fitted with a 12-inch Zurn Series 510 pipeline strainer equipped with a 40 mesh reinforced basket to catch and remove solids from the fuel stream.

(3) Booster Pumps: The two 6-inch Fairbanks-Morse Company Figure 5844, single-stage, horizontal split case, double suction centrifugal booster pumps are connected in parallel. Each pump has a capacity of about 1400 GPM at 280 foot head.

(4) Pump Control Valve: Downstream from the plug valves, and in the pump discharge header, a Fisher Governor Company, 8-inch, Model 657AR control valve with pneumatic valve positioner, is installed.

(5) Air Compressor: A Worthington, Model $\frac{1}{2}$ UR-1, motor driven tank mounted air compressor is installed in the room containing the pressure and flow controllers. This unit supplies compressed air to operate the Fisher control valve and air actuated instruments previously referred to.