AD-A173 684 FEASIBILITY STUDY OF COAL GASIFICATION/FUEL CELL/COGENERATION PROJECT FOR (U) EBASCO SERVICES INC NEW YORK C TRAPP ET AL 02 APR 85 DAAG29-85-C-0007 1/1

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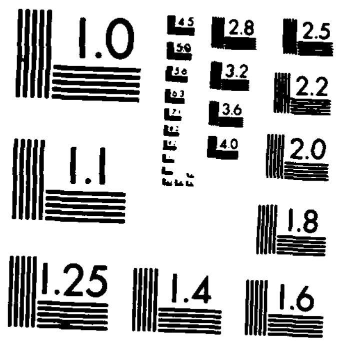

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FEASIBILITY STUDY OF

COAL GASIFICATION / FUEL CELL / COGENERATION PROJECT

FORT GREELY, ALASKA SITE
PRELIMINARY SURVEY

REPORT CLIN 000204

PREPARED FOR

DEPARTMENT OF THE ARMY
AND
GEORGETOWN UNIVERSITY

MARCH, 1985

EBASCO
EBASCO SERVICES INCORPORATED
Two World Trade Center
New York N.Y. 10048

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Preliminary Survey of the Fort Greely, Alaska site for Coal Gasification/ Fuel Cell/Cogeneration system.

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Report describes site characteristics that could affect the feasibility of a Coal Gas/Fuel Cell/Cogeneration project and describes existing sources of thermal and electric energy.

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Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

TABLE OF CONTENTS

LIST OF FIGURES

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PRELIMINARY SITE SURVEY REPORT

1.0 Introduction

The purpose of this report is to present the results of the preliminary survey of the Fort Greely, Alaska site proposed for a Coal Gasification/Fuel Cell/Cogeneration (GFC) system.

The site characteristics that could effect the feasibility of a GFC installation are discussed as well as existing methods for generating and distributing thermal and electric energy.

2.0 Summary

The Fort Greely site provides ample land area adjacent to and north of the Main Post cantonment area for the GFC system and for the required coal stockpile that would serve both the GFC and the adjoining future cogeneration plant (See Figure AL 3-1).

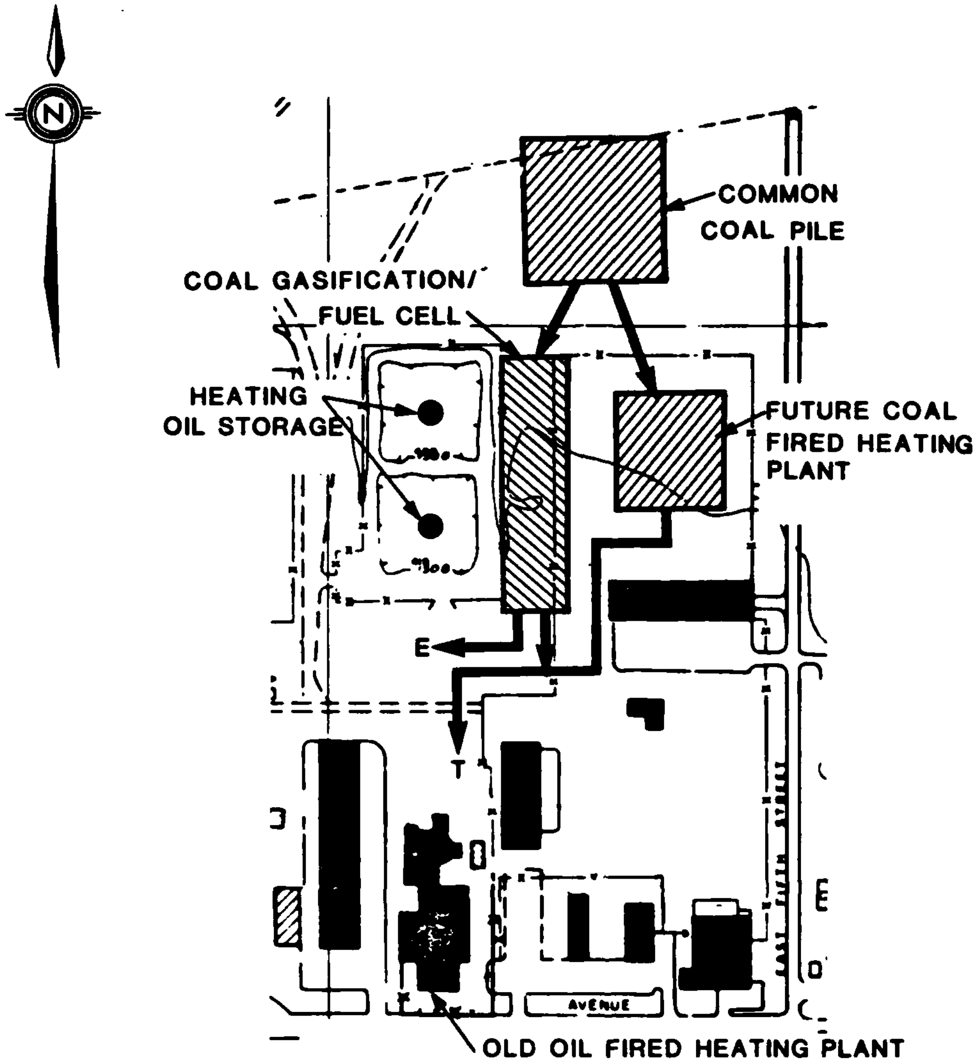
Extreme cold during winter months will affect system equipment selection and energy losses. Use of glycol brine with fan coolers in lieu of wet cooling towers must be considered for process heat removal. A greater amount of thermal output must be diverted for space heating and for heating makeup well water from near freezing temperatures.

Because of winter severity and the remoteness of this site, a minimum coal storage capacity of 120 days is required [1]. For the same reason, storage capacity of process chemicals must also be increased. Distance of this site from industry will also affect marketability of gasification and gas processing byproducts, including tars and oils, sulfur and ammonium sulfate. As a consequence, it may be advantageous to fire the tars and oils in an on-site boiler and dispose of the remaining byproduct chemicals at the local landfill.

Construction methods must account for the perma-frost layer with any foundation mats or spread footings placed at a depth that is not affected by seasonal thaw cycles. Because of the eleven foot freeze depth, below grade utilities are run in heated and insulated "utilidors" which have a much higher installed cost than directly buried utilities.

With complete electrical and thermal backup initially from the existing Fort Greely heating and power plant and later from the proposed adjacent cogeneration plant, standby equipment can be reduced or eliminated at considerable cost savings.

At approximately 7 MW net output, the GFC exceeds Fort Greely demand, resulting in power available for sale to Golden Valley Electric Authority (GVEA). Details of the disposal of this energy must be coordinated with the Fort Wainright power generating system which



PROPOSED DISTRIBUTION OF GFC ENERGY

ELECTRIC (E):

TO FT GREELY: 2500KW (VARIES)
TO ELECTRIC UTILITY: 4500 KW

THERMAL (T):

ALL TO FT GREELY

DOA / GEORGETOWN UNIVERSITY

COAL GAS / FUEL CELL / COGENERATION

FORT GREELY, ALASKA SITE

PLOT PLAN

FIGURE AL 3-1

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heretofore, has supplied most of Fort Greely's power requirements. In addition to the GFC operator receiving avoided cost payments from GVEA for this excess power, the GVEA charges to Fort Greely for power wheeled from Fort Wainright should be eliminated.

Potential emission sources are controllable by system design and operating practices to within federal and local environmental limits. For example, fugitive dust emissions will be controlled by enclosures for material handling equipment, and by dust suppression sprays and dust collectors; sulfur pit emissions will be controlled by recycling vapor to the oxidizer tanks; the occasional excess gasifier output due to fuel cell demand reduction will be handled by flaring; noise emissions of coal delivery and coal handling and of rotating equipment can be reduced by enclosures and/or direct acoustic treatment.

The Fort Greely site has no peculiarities or features that would affect the technical risks identified in the Basic System Description (CLIN 0001) and none that would eliminate the use of this site for a GFC system.

3.0 Site Description

The Fort Greely, Alaska military reservation is one of four sites proposed for the Gasification/Fuel Cell/Cogeneration (GFC) system and is located ninety miles southeast of Fairbanks, at an elevation of 1314 feet above mean sea level(2).

The Main Post area, which occupies about 184 acres of the reservation, is one mile east of Richardson Highway, about 4.5 miles south of the town of Delta Junction and has a population of 1164 military and civilian personnel(3). Excluding small buildings in outlying areas, the Main Post includes about 81 buildings served by a central heating plant in Building 606. The buildings are of permanent type construction and most were built during the 1950's and 1960's. Approximately a mile north of the Main Post is Allen Airfield and the Old Fort area which includes a hangar and some temporary buildings not in use.

This remote section is served by its own oil-fired heating plant in Building No. T-101.

Because the Main Post can absorb all of the GFC thermal output and because of the high cost of installing an interconnecting utilidor, there are no plans in this study for providing GFC steam to the Old Fort Area.

Winter outdoor design temperature is -48°F which is exceeded for 99 percent of the time on the average, for the coldest three months with a mean wind speed 5 mph(2). The highest recorded wind speed is 82 miles per hour(4). Using a base of 65°F and a 30 year period of record, annual heating degree days are 13,698.

Summer outdoor design conditions are 80°F dry bulb and 61° F mean coincident wet bulb. The stated dry bulb is equaled or exceeded 1% of the time on the average, during the warmest four consecutive months.

Road access to Fort Greely from Fairbanks is via the Alaska Highway, Route 2. Richardson Highway, Route 4 and Route 2 connect to points south and southeast, respectively. These roads are usable year round.

Water is supplied to the Main Post from two wells: one with 525 gpm capacity is at power plant Building 606 and one with 375 gpm capacityis at Building 625. Water is pumped to a 188,000 gallon storage tank in Building 606 and from there, to two pneumatic pressurizing tanks. Also available are two 1000 gpm wells which are not now in use. Winter well water temperature is approximately 34°F.[5]

Sanitary sewage from the Main Post flows in a 14 inch asbestos - cement pipe to a lift station at the sewage lagoon. The sewage treatment plant there has a capacity of 170,000 gallons per day[6].

Storm water is carried from the main post by open drainage to Jarvis Creek which is a mile east of the Main Post[7].

A landfill area is located two miles from the Main Post[5].

The proposed location of the GFC shown in Figure AL 3-1, is at the north end of the Main Post, east of the heating oil storage tanks and approximately 400 feet north of the existing power plant in Building No. 606. North of and adjacent to the GFC would be located an open coal pile meeting the requirement for 120 day storage. This same coal pile would serve the future coal fired cogeneration plant (intended to replace the existing oil fired plant) which may be located east of the GFC.

The proposed location for the GFC and coal pile, maintains a suitable separation from the Main Post community but is sufficiently close to the old power plant for piping and other utility interconnections and for access by the operating staff.

4.0 Site Peculiarities

1. Extremely low regional temperatures will affect system and foundation design, overall efficiency and economics.

2. The site is remote from population centers and from industry.

3. While the site average electrical requirement is about 25 percent of the GFC capacity, it's thermal load is greater than the expected GFC thermal output.

4. Complete thermal and electric backup capacity for the GFC will initially be available from the existing oil fired heating/power plant and will subsequently be available from the future coal-fired cogeneration plant.

5. There are no plans for expansion of facilities that would increase thermal or electrical loads of the post[4].

5.0 Existing Thermal Energy Sources and Distribution

Main Post heating requirements are supplied by the heating and power plant located in Building No. 606 at the north end of the cantonment.

Heating plant boilers (Erie City Mfg Co) Nos. 1, 2 and 3 have ratings at 150 psig, of 35,000 lb/hr, 35,000 lb/hr and 50,000 lb/hr, respectively, and are fired with arctic diesel oil No. 2. However, by future modification to the ID fans, Boilers 1 and 2 may each be upgraded to a capacity of 50,000 lb/hr[5].

Boiler header steam at a pressure of 100 psig is reduced to 60 psig for underground distribution to the Main Post in a "utilidor" system.

Utilidors are of insulated concrete construction, typically sized at 5' wide by 5'-6" high and 3' wide by 3'-6" high. The utilidors contain, in addition to the heating steam and condensate returns, other utilities, such as potable water, sanitary drains, telephone and fire alarm cables. Electrical power distribution is not included in the utilidors.

At each Main Post building, the 60 psig steam is reduced to 8 to 10 psig where it is used for domestic hot water heating and directly or indirectly, for space heating. Space heating in most of the commercial or community types of buildings is by steam and in most housing, through a steam to hot water convertor, is by hot water.

Data received for 1984,[5] gives boiler plant loads ranging between 7000 lb/hr and 3500 lb/hr in summer and between 20,000 lb/hr and 6,000 lb/hr in winter. During the site survey of 2/21/85, steam flow indicator readings for all three boilers totaled 48,000 lb/hr at an outdoor temperature of minus 49°F.

6.0 Existing Electrical Energy Sources and Distribution

Power to Fort Greely is available from two sources. The first source is the Fort Wainright generating plant which wheels its power at 24.9 kV to Fort Greely through the GVEA transmission system over a distance of approximately 90 miles. Power is stepped down at Fort Greely main station to 2400 volts, metered and distributed. Annual power from this source (2/84 to 1/85) was 14,629,000 kWH(8).

The second source of power is the Fort Greely five unit diesel-electric plant fueled with diesel arctic No. 2. Diesel-generator Units 1,2 and 3 are rated at 1 MW each and Units 4 and 5 at 1.25 MW each. The diesel-generators are operated as required to limit the peak demand on the GVEA transmission line to approximately 2500 kW(5).

Annual power from the Fort Greely diesel plant for the same period (2/84 to 1/85) was 1,055,795 kWH or 6.7% of the base total of 15,684,795 kWH.

Based on records reviewed during the site visit of February 21, 1985, the maximum monthly demand in the above referenced year varied from 3312 kW in February, 1984, to 2112 kW in both June and July. For the same months, the average demand however, was 1900 kW and 1500 kW, respectively.

Therefore, with a net output of 7000 kW the fuel cell would have a substantial excess available for export to Fort Wainright or for sale to GVEA.

7.0 Fuel Supply

Although there is the potential for other coal mines in the area becoming operational in the near future[4], the only one in Alaska operating at this time is the Usibelli Coal Mine, at Healy. This mine is approximately 200 miles by truck from Fort Greely.

The recommended shiping route [8] is by the Alaskan Railway from the mine to the Fort Wainright stockpiling area, where it would be transferred to 20 ton trucks for the remaining 90 mile trip to Fort Greely.

The Usibelli Mine has no screening facilities and provides (2"x0") coal size with about 25% fines (coal size below 1/4").

If Fort Wainright is provided with screening facilities, the fines could be removed prior to truck loading and then used in the Fort Wainright boilers.

However, the preferred arrangement would be to use the fines screened at Fort Greely in the proposed coal fired cogeneration plant, assuming that it becomes operational at the same time or before the GFC.

8.0 List of References

8-1 Technical Manual TM 5-810-1, August 1983, Department of the Army, p.5-7.

8-2 Technical manual TM-5-785, Engineering Weather Data, July 1, 1978, Department of the Army, p.1-3.

8-3 Atlas/State Data Abstract for the United States, Fiscal Year 1983, Department of Defense, p.11.

8-4 Personal communication with Alaska Directorate of Engineering and Housing.

8-5 Personal communication with Fort Greely operating personnel.

8-6 Drawing No. 18-02-120, Sheet 94, Fort Greely General Sanitary Sewer Map, October, 1977.

8-7 Drawing No. 18-02-120, Sheet 194, Fort Greely General Storm Drainage Map, October, 1977.

8-8 Personal communication with representative of Usibelli Coal Mine, Inc.

APPENDIX A

Attached References

REF 8-1

TECHNICAL MANUAL
TM No. 5-810-1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 15 August 1983

MECHANICAL DESIGN

HEATING, VENTILATING, AND AIR CONDITIONING

*This manual supersedes TM 5-810-1, January 1956.

cooled to increase compressor capacity by submerging condenser tubes, utilizing an external subcooler or with a liquid suction heat exchanger. Each degree of subcooling increases refrigeration capacity by 0.5 percent.

f. Ponds, rivers and wells.

(1) The proximity and chemical composition of a natural cooling water source should be considered to determine the feasibility of its use. Water treatment or special tube material should be provided to prevent condenser tube fouling and corrosion. Fouling factors for different water sources as presented in the ASHRAE Handbooks may be used when analysis of the local water supply is unavailable.

(2) Where condenser water intakes and outlets could be obstructed by debris or fish, intake screens will be installed. The ecological impact of using a natural water source must be discussed with state conservation departments prior to use.

5-4. Heat exchanger

a. Water-to-water. Water-to-water exchangers will be of a shell-and-tube type and will be constructed and tested in accordance with Section VIII of the ASME Boiler and Pressure Vessel Code.

(1) Shell-and-tube type exchangers are generally used with high temperature water systems to produce lower temperature water for specific zone heating requirements, process water or domestic hot water. Higher temperature water will be circulated through the tubes, lower temperature water circulated in the shell.

(2) Evaluate the most economical combination of the following before the final selection is made: number of passes, temperature difference, pressure drop and pumping horsepower.

(3) Provided adequate room for tube bundle removal.

b. High-temperature water-to-steam. Steam generators fired with high temperature hot water can be used to satisfy local steam demands where high temperature water is distributed from the central plants.

c. Steam-to-hot water converters.

(1) Converters of the shell-and-tube type will be designed and constructed in accordance with Section VIII of the ASME Boiler and Pressure Vessel Code.

(2) Water will flow through the converter tubes, and steam will be condensed in the shell. To reduce corrosion. air separators will be used where appropriate. Converters should be pitched up for proper air venting. Install vacuum breaker to facilitate draining of condensate.

5-5. Incinerators

Solid waste incineration will be used as described in DoD 4270.1-M and designed in accordance with TM 5-814-4. Incineration should only be used after it has been determined that waste disposal through either resource recovery, contract services or sanitary landfill is not desirable. Air pollution control systems are covered by TM 5-815-1.

5-6. Fuel supply systems

The fuel selection will be made in accordance with DoD 4270.1-M and policies set forth in AR 420-49.

a. Oil—storage and transport.

(1) Storage facilities will be designed in accordance with ASHRAE Handbooks. Oil storage requirement is 30 days supply based on the maximum continuous 30-day usage. Where oil is used as a standby fuel, storage will be based on 5 percent of the annual fuel requirements. Safety considerations presented in NFPA Standards will be followed.

(2) Distribution and fuel handling systems will be in accordance with ASHRAE Handbooks. Necessary tank heaters and oil preheaters will be included in systems designed for handling heavy oils. Oil fired steam plants shall be provided with oil meters on both supply and return pipes so that oil consumption can be measured. Hot water boiler plants with output capacities of 5000 MBTUH or greater will be provided with fuel oil meters.

b. Coal—storage and transport.

(1) Coal storage shall be as follows:

—60 day minimum for small requirements in mild climates and close to source of supply.

—90 day minimum for majority of facilities.

—120 day minimum for areas subject to severe weather or remote from source of supply.

(2) Storage facilities will be designed to provide necessary storage with minimum of loss through weathering and fire. The site for a coal pile should be a well-drained area free of standing water, and not subject to flooding from nearby streams or run-off. If a well-drained area is not available, drainage ditches should be constructed along side the pile. The pile should be built in successive layers of not more than 2-feet thick with the initial layer never to be recovered. Coal piles should be constructed in rounded or pyramid shape with the steepest slopes possible to prevent rain or melting snow from penetrating into the pile. Piles should never be located near heat sources such as smoke stacks, steam pipes or possible ignition sources such as refuse, wood or vegetation. Where coal pile acid run-off may contaminate natural waterways or groundwater supplies, a run-off collection and neutralization system should be installed. Operational storage should be kept in the plant in silos and overhead bins.

(3) The coal and ash handlings system will pro-

vide handling to comply with all air pollution regulations. Bucket elevators, either centrifugal-discharge or continuous-bucket types, should, in general, be used where vertical lifts are required. For longitudinal runs or inclines up to 15 or 20 degrees, belt conveyors may be used. Coal weighing equipment will be provided for plants of 14,000 MBTUH or larger. Coal and ash handling equipment will not be part of the original installation, but spare will be allocated, for gas or oil fired plants that are required to fire coal when converted. Where pulverized coal is fired, the safety requirement presented in NFPA No. 85E will be followed.

c. Gas. Gas supply systems will be designed in accordance with AR 420-49 and NFPA Standards.

d. Refuse Derived Fuel (RDF). RDF will be evaluated whenever refuse incineration is considered. In most cases, RDF can be stored and used as supplemental fuel whenever a peak load exists. RDF is usually low in sulphur content and can therefore be mixed with high sulphur fuel to reduce the flue gas SO_2 levels.

(1) Refuse is shredded and dryed, while magnetic material and inorganic waste are removed through air classification. The remaining material is then milled and fed pneumatically to the boiler to be burned in suspension with pulverized coal.

(2) The production of pelletized fuel is similar to that described; however, the final product is in a pellet form which can be used in a stoker fed boiler.

(3) Pyrolysis is a process in which solid wastes are thermally degraded in a controlled atmosphere to produce either synthetic fuel oil or gas, depending on the operating mode. Over one barrel of low sulphur oil or 600 SCF of 800 Btu per cubic foot gas per ton of refuse can be produced. This production flexibility makes this process particularly attractive; however, it is only feasible for large-scale operations.

e. Wood (biomass) fuels. Wood (wood-chips or pelletized wood) will be evaluated as a fuel in areas where this fuel is available. Consideration should be on the basis of wood as a supplement to coal, RDF or other primary solid fuels, unless sufficient wood is available to meet the total fuel requirements. Wood contains basically no sulfur and has lower ash content than coal and is therefore attractive where pollution is a problem. Overall wood fuels evaluation must be on a life-cycle cost basis. Wood fuels generally require covered storage areas.

5-7. Auxiliaries

When necessary in order to guard against power failure, the central heating plant should be provided with a diesel or steam-driven stand-by electric generator. Where a portable stand-by electric generator will serve this purpose, the plant switchboard should have a connection for same. The necessity and size of stand-by electric generators provided should be approved by DAEN-ECE-E prior to final design. Boiler plant auxiliaries should, in general, be electrically driven; however, whenever an uninterrupted supply of steam is essential, one of the boilers should be provided with steam-driven auxiliaries. Individual forced and/or induced-draft fans should be provided with each boiler unit. Pumps should include stand-by equipment in case of repairs. Condensate from the system will be returned to a steel surge tank of adequate size and thence to feed water heater of the deaerating type. A simple combustion control system should be provided to regulate the fuel and the air supply automatically in accordance with the demand for steam. Suitable means should also be provided for operating the boilers manually. The exhaust steam from any auxiliaries should be used for heating feedwater, and special precautions should be taken to prevent exhaust steam from being wasted.

STATE / Station	Lat	Long	Elev	99%	97.5%	Pvlg Wind	Mean Speed	Heating	1%	MCWB	2.5%	MCWB	Mean Daily Range	Pvlg Wind	5%	MCWB	1%	2.5%	5%	≧ 93°F	≧ 80°F	≧ 73°F	≧ 67°F
[illegible]	[illegible]	[illegible]	[illegible]	-44	-39	E	3	13412	76	61	71	59	25	NNW	68	57	62	60	58	0	10	0	1
Annette	55 02	131 34	110	13	17	NE	12	7053	74	61	70	59	17	NW	66	58	62	60	59	0	6	0	1
Anvil Mt	64 34	165 22	1100	-29	-27	N	8	14555	64	56	60	54	18	W	57	53	57	55	54	0	0	0	0
Attu/Casco Cove CGS	52 50	173E10	39	20	22	NW	12	8339	60	55	57	54	10	W	55	52	57	54	52	0	0	0	0
Aurora	62 24	145 02	1900	-41	-37	NNW	3	13593	76	59	73	57	31	SE	67	56	61	59	57	0	17	0	0
Barrow	71 18	156 47	31	-45	-41	SW	8	20265	57	53	53	50	16	SE	49	47	54	50	47	0	0	0	0
Barter Island	70 08	143 38	39	-45	-41	SW	7	19994	56	52	52	49	14	E	49	47	52	50	47	0	0	0	0
Bear Creek	65 15	151 55	1650	-40	-35	W	10	13861	77	60	73	59	22	WSW	70	57	63	60	59	0	6	0	0

STATE	LOCATION			WINTER DESIGN DATA HEATING				DEGREE DAYS	SUMMER DESIGN DATA AIR CONDITIONING											SUMMER CRITERIA DATA AIR CONDITIONING			
				Dry Bulb					Dry Bulb								Wet Bulb			Dry Bulb		Wet Bulb	
Station	Lat	Long	Elev	99%	97.5%	Pvlg Wind	Mean Speed	Heating	1%	MCWB	2.5%	MCWB	Mean Daily Range	Pvlg Wind	5%	MCWB	1%	2.5%	5%	≧ 93°F	≧ 80°F	≧ 73°F	≧ 67°F
	° '	° '	feet	°F	°F	dir	knots	annual	°F	°F	°F	°F	°F	dir	°F	°F	°F	°F	°F	hrs	hrs	hrs	hrs
ALASKA (CONT)	N	W																					
Beaver Creek	63 03	141 49	2433	-51	-47	SW	2	14770	77	59	74	57	27	NW	71	56	61	59	57	0	12	0	1
Bethel AFS	60 47	161 53	160	-32	-28	NNE	10	13203	74	60	69	58	20	N	66	57	62	59	57	0	4	0	2
Bethel Aprt	60 47	161 48	125	-32	-28	NNE	10	13203	74	60	69	58	20	N	66	57	62	59	57	0	4	0	2
Bettles	66 55	151 31	644	-51	-45	NNW	4	15925	78	62	75	61	23	S	72	59	63	61	60	0	20	0	5
Big Delta/Allen AAF	64 00	145 44	1268	-48	-43	S	4	13698	80	61	76	60	24	N	73	58	62	60	59	0	30	0	1
Big Mountain	59 23	155 13	2150	-18	-13	N	10	12144	64	55	61	54	20	NW	57	52	57	54	53	0	0	0	0
Black Rapids	63 29	145 50	2703	-35	-30	S	4	12553	77	59	73	58	20	N	70	56	60	58	57	0	11	0	0
Blair Lake AF Range	64 23	147 41	725	-50	-46	S	2	14068	80	61	77	59	27	N	74	59	63	61	60	0	38	0	4
Boswell Bay AFS	60 25	146 09	800	-5	0	NE	5	9765	67	57	63	57	22	SW	60	55	59	57	56	0	0	0	0
Campion AFS	64 42	156 44	363	-47	-44	NW	3	14780	78	62	75	60	23	N	71	58	64	62	60	0	24	0	12
Canyon Creek	64 18	146 32	1779	-42	-37	S	4	13298	79	60	75	59	24	N	72	57	61	59	58	0	22	0	1
Cape Lisburne AFS	68 53	166 07	12	-34	-31	ESE	7	17063	60	53	56	51	13	SW	53	50	54	51	49	0	0	0	0
Cape Newenham AFS	58 39	162 04	541	-14	-11	N	11	11481	60	54	58	53	10	SSE	56	52	55	54	53	0	0	0	0
Cape Romanzof AFS	61 47	166 02	457	-17	-14	NE	18	13130	62	56	59	54	10	NE	57	52	57	54	52	0	0	0	0
Cape Sarichef	54 36	164 55	560	9	12	NNW	14	9985	61	56	58	53	10	SSE	56	52	57	55	53	0	0	0	0
Cathedral	63 23	143 47	2010	-55	-51	SW	2	15275	78	60	75	58	27	NW	72	57	62	60	58	0	17	0	1
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Cordova	60 30	145 29	42	-7	-2	E	5	9765	70	58	66	58	22	SW	63	56	60	58	57	0	0	0	0
Diamond Ridge	59 41	151 37	1100	-1	2	NE	6	10394	63	56	61	55	19	SW	58	54	57	56	54	0	0	0	0
Donnelly	63 47	145 51	2954	-35	-30	S	4	12683	76	58	72	57	20	N	69	55	59	57	56	0	0	0	0
Driftwood Bay	53 58	166 51	24	13	16	N	12	9197	68	62	63	59	12	N	59	56	62	59	56	0	0	0	4
Driftwood Bay AFS	53 58	166 53	1250	8	11	N	15	10637	64	60	59	57	12	N	55	54	60	57	54	0	0	0	0
Dutch Harbor	53 53	166 32	13	13	16	N	12	9197	68	62	63	59	12	N	59	56	62	59	56	0	0	0	4
Eielson AFB/Fairbanks	64 40	147 06	545	-52	-48	S	2	14498	80	61	77	59	27	N	74	59	63	61	60	0	38	0	4
Elmendorf AFB/Anchorage	61 15	149 48	212	-22	-16	NE	4	10722	71	58	68	57	17	W	66	56	60	58	57	0	2	0	0
Fairbanks IAP	64 49	147 52	436	-51	-47	N	3	14345	82	62	78	60	27	WSW	75	59	64	62	60	0	53	0	5
Fort Greely	63 58	145 44	1314	-48	-43	S	4	13698	80	61	76	60	24	N	73	58	62	60	59	0	30	0	1
Fort Richardson/Bryant AAF	61 16	149 39	342	-22	-16	NE	4	10722	71	58	68	57	17	W	66	56	60	58	57	0	2	0	0
Fort Wainwright	64 50	147 37	448	-51	-47	N	3	14345	82	62	78	60	27	WSW	75	59	64	62	60	0	53	0	5
Fort Yukon AFS	66 34	145 15	431	-60	-57	SW	3	16084	80	62	77	60	24	W	73	59	66	63	61	1	29	1	23
Galena	64 44	156 56	152	-49	-46	NW	3	15087	78	62	75	60	23	N	71	58	64	62	60	0	20	0	12
Gerstle River	63 48	145 00	1512	-46	-41	S	4	13398	80	61	76	60	24	N	73	58	62	60	59	0	30	0	1

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Department of Defense

ATLAS / STATE DATA ABSTRACT FOR THE UNITED STATES

Fiscal Year 1983

Issued by

Department of Defense
Washington Headquarters Services
Directorate for Information
Operations and Reports

ALASKA

FISCAL YEAR 1983 (DOLLARS IN THOUSANDS)

Personnel/Expenditures	Total	Army	Navy & Marine Corps	Air Force	Other Defense Activities
I. Personnel - Total	25,296	10,626	1,995	12,631	44
Active Duty Military	20,680	7,882	1,832	10,966	-
Civilian	4,616	2,744	163	1,665	44
II. Expenditures - Total	$ 958,310	$ 355,349	$ 57,705	$ 432,580	$ 112,676
A. Payroll Outlays - Total	571,881	250,569	39,103	280,930	1,279
Active Duty Military Pay	354,132	136,577	28,445	189,110	-
Civilian Pay	155,052	87,435	5,434	60,904	1,279
Reserve & National Guard Pay	14,092	10,954	370	2,768	-
Retired Military Pay	48,605	15,603	4,854	28,148	-
B. Prime Contracts Over $25,000 - Total	386,429	104,780	18,602	151,650	111,397
Supply Contracts	92,154	2,353	-	1,427	88,374
R&D Contracts	1,394	274	288	335	497
Service Contracts	237,400	50,552	15,166	149,156	22,526
Construction Contracts	36,847	32,967	3,148	732	-
Civil Function Contracts	18,634	18,634	-	-	-

Major Locations of Expenditures	Expenditures Total	Payroll Outlays	Prime Contracts	Major Locations of Personnel	Military and Civilian Personnel Total	Active Duty Military	Civilian
Elmendorf AFB	$ 237,435	$ 158,027	$ 79,408	Elmendorf AFB	7,507	6,033	1,474
Fort Richardson AFB	142,382	128,501	13,881	Fort Richardson	5,850	4,498	1,352
Anchorage	138,627	29,423	109,204	Eielson AFB	3,676	3,370	306
Eielson AFB	83,691	66,565	17,126	Fort Wainwright	2,991	2,417	574
Fort Wainwright	74,312	54,708	19,604	Adak	1,931	1,768	163
Clear Missile	58,790	5,983	52,807	Fort Greely	1,164	934	230
Adak	49,527	32,810	16,717	Shemya AFB	676	607	69
Shemya Station	34,491	14,425	20,066	Anchorage	368	126	242
Fort Greely	29,000	26,214	2,786	Galena	353	340	13
Fairbanks	20,174	4,651	15,523	King Salmon	338	320	18

Prime Contracts Over $25,000	Total	Army	Navy & Marine Corps	Air Force	Other Defense Activities
Fiscal Year 1983	$ 386,429	$ 104,780	$ 18,602	$ 151,650	$ 111,397
Fiscal Year 1982	325,312	101,688	27,169	91,733	104,722
Fiscal Year 1981	344,658	67,329	28,903	72,267	176,159

Top Five Contractors Receiving the Largest Dollar Volume of Prime Contract Awards in this State	Total Amount	Major Areas of Work
1. North Pole Refining	$ 60,509	Petroleum.
2. Felec Services, Inc.	52,735	Operation. of govt. facility; radar & navigation.
3. RCA Corporation	46,607	Operation of govt. facility;electronic & communication.
4. Alascom, Inc.	22,446	Communication Services.
5. Aleutian Construction	17,809	Construction;airfield structures.
Total of Above	$ 200,106	(51.8% of total awards over $25,000)

END

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