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Fort Stewart Integrated Resource Assessment

Volume 2: Baseline Detail

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Abstract

This report documents the assessment of baseline energy use at Fort Stewart, a U.S. Army Forces Command facility located near Savannah, Georgia. This is a companion report to Volume 1, *Executive Summary*, and Volume 3, *Integrated Resource Assessment*.

The U.S. Army Forces Command (FORSCOM) tasked Pacific Northwest Laboratory (PNL)^(a) to identify, evaluate, and assist in acquiring all cost-effective energy projects at Fort Stewart. PNL, in support of the U.S. Department of Energy (DOE) Federal Energy Management Program (FEMP), has designed a model program applicable to the federal sector for this purpose. The model program 1) identifies and evaluates all cost-effective energy projects; 2) develops a schedule at each installation for project acquisition considering project type, size, timing, and capital requirements, as well as energy and dollar savings; and 3) targets 100% of the financing required to implement energy efficiency projects. PNL applied this model program to Fort Stewart.

The analysis examines the characteristics of electric, natural gas, oil, propane, and wood chip use for fiscal year (FY) 1990. The results include energy-use intensities for the facilities at Fort Stewart by building type, fuel type, and energy end use. A complete energy consumption reconciliation is presented that accounts for the distribution of all major energy uses and losses among buildings, utilities, and central systems.

(a) Pacific Northwest Laboratory is operated for the U.S. Department of Energy by Battelle Memorial Institute under contract DE-AC06-76RL0 1830.

Summary

The U.S. Army Forces Command (FORSCOM) has tasked the Pacific Northwest Laboratory (PNL), in support of the U.S. Department of Energy (DOE) Federal Energy Management Program (FEMP), to identify, evaluate, and assist in acquiring all cost-effective energy projects at Fort Stewart. The FEMP model integrated resource planning (IRP) program is being applied by PNL for federal customers served by the Georgia Power Company.

This volume, *Baseline Detail*, documents the baseline energy use at Fort Stewart, a FORSCOM base near Savannah, Georgia. The analysis characterizes electric, natural gas, #2 & #5 fuel oils, propane, and wood chip use for the federal fiscal year (FY) 1990. It provides a breakdown of energy use for the Fort Stewart facilities by building type, fuel type, and energy end use. A complete energy consumption reconciliation is presented that includes the accounting of all energy use among buildings, utilities, central systems, and applicable losses.

The Fort's primary mission is to support the 24th Infantry Division (Mechanized). The 279,270-acre facility is divided (for energy consumption and billing purposes) into four major sectors: on-post utility (including exterior lighting, pumping, and transmission and distribution losses), commercial, National Guard, and family housing. Of these four sectors, three contain non-utility buildings whose energy use is generally correlated with building function and floor area. Table S.1 summarizes the number of buildings and total square feet for each of the areas. The Fort contains 2,274 buildings, encompassing a total area of 10,896,819 ft². In FY 1990, nearly 27,000 active military personnel were assigned to Fort Stewart.

Table S.2 summarizes the typical annual energy consumption and cost for all facilities at Fort Stewart. For each energy type, the annual total is shown in units appropriate to the energy type and in a common unit as a basis for comparison. The total consumption values represent typical current annual usage, from the best available data during 1990 and 1991. The annual energy consumption was 1,421,900 MBtu at a cost of \$9,045,000. Table S.3 breaks down the energy consumption (MBtu/yr) by end use and fuel type for the Fort's three major areas.

This report documents all elements of the energy use baseline analysis conducted for Fort Stewart. Site characteristics that affect all forms of energy use, including facility, climate, geography, mission and occupancy characteristics, are also documented.

Table S.1. Fort Stewart Building Characterization

Energy Use Sector	Number of Buildings	Total Floorspace (ft ²)	Percent of Total Floorspace
Commercial	1,009	6,301,662	57.8
National Guard	594	1,271,539	11.7
Family Housing	671	3,323,618	30.5
Total	2,274	10,896,819	100.0

Table S.2. Typical Annual Energy Consumption and Energy Cost at Fort Stewart

Energy Type	Yearly Total	Yearly Total MBtu ^(a)	Percent of Total Energy Consumption	Energy Cost 1990\$ x 10 ³	Percent of Total Cost
Electricity	151,600 MWh	517,400 ^(b)	36.4	7,040	77.8
Natural Gas	1,439 ktherm	143,900 ^(c)	10.1	779	8.6
Fuel Oil #2:	486 kgallon	67,510 ^(d)	4.7	272	3.0
Fuel Oil #5:	546 kgallon	80,020 ^(d)	5.6	297	3.3
Propane	174 kgallon	15,842 ^(e)	1.1	77	0.6
Wood Chips	66,700 tons	600,300 ^(f)	42.2	580	6.4
Total		1,421,9000	100.0	9,045	100.00
<p>(a) 1 MBtu = 1,000,000 Btu. (b) 3,413 Btu/kWh. (c) 100,000 Btu/therm; 1,031 Btu/ft³ of natural gas. (d) 0.1388 MBtu/gal of #2 fuel oil, 0.1466 MBtu/gal of #5 fuel oil. (e) 0.0913 MBtu/gal of propane. (f) 9 MBtu/ton.</p>					

This report is organized in nine sections. Section 1 describes the mission, geography, climate, utilities, buildings, and occupancy characteristics. Section 2 describes energy sources. Section 3 presents detailed electrical energy consumption, demand, and time-of-use data as compiled from logs, billing records, standard reporting forms, and computer files. Sections 4 through 7 outline the site's non-vehicular consumption of other fuel types. Section 8 presents estimates of end-use energy consumption by building type and utility. The Section 8 estimates are the primary result of the baseline analysis and the most detailed level to which energy use is generally traced in a site-wide conservation potential assessment. Energy use may be traced to a finer level of detail in the process of analyzing certain specific energy conservation or fuel-switching measures (see Volume 3), but such detail is not considered part of the energy-use baseline. Section 9 lists the references used to develop the energy baseline for Ft. Stewart.

Table S.3. Energy Consumption by End Use (MBtu/yr)

Fuel Type/End Use	Fort Area			
	Commercial	Family Housing	Utility	Total
Electric:				
Heating	0	4,385	0	4,385
Cooling	35,790	45,538	0	81,328
Vent./Fans	37,400	8,029	0	45,429
DHW	0	2,477	0	2,477
Cooking	9,728	621	0	10,349
Refrigeration	18,224	15,604	0	33,828
Interior Ltg.	77,766	32,972	0	110,738
Exterior Ltg.	3,518	3,518	0	7,036
Other Bldg. End Use	55,556	9,441	0	64,998
Nat. Guard	16,153	0	0	16,153
Central Plant	0	0	105,776	105,776
Street Ltg.	0	0	25,516	25,516
Trans. & Dist. Loss	0	0	9,353	9,353
Total	254,136	122,585	140,645	517,366
Percent of Total	49.1 %	23.7 %	27.2 %	100.0 %
Natural Gas:				
Heating	32,098	42,746	0	74,844
DHW	16,025	26,880	0	42,905
Cooking	14,233	10,951	0	25,184
Other	964	0	0	964
Total	63,320	80,577	0	143,897
Percent of Total	44.0 %	56.0 %	0.0 %	100.0 %
Fuel Oil #2:				
Heating	20,501	0	0	20,501
DHW	12,662	0	0	12,662
Central Plant	0	0	34,336	34,336
Total	33,163	0	34,336	67,499
Percent of Total	49.1 %	0.0 %	50.9 %	100.0 %
Fuel Oil #5:				
Central Plant	0	0	80,020	80,020
Propane:				
Heating	8,815	32	0	8,847
DHW	3,963	19	0	3,982
Cooking	1,889	8	0	1,897
Other	520	0	0	520
DEH (Trlr Park)	0	595	0	595
Total	15,187	654	0	15,841
Percent of Total	95.9 %	4.1 %	0.0 %	100.0 %
Wood Chips:				
Central Plant	0	0	600,300	600,300
Total:	365,806	203,816	855,301	1,424,923
Percent of Total:	25.7 %	14.3 %	60.0 %	100.0 %

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Abbreviations and Acronyms

AAF	Army Air Field
AAFES	Army/Air Force Exchange Service
A/C	air conditioning
AGL	Atlanta Gas Light Company
AHU	air-handling unit
ASD	adjustable speed drive
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc.
BLCC	Building Life-Cycle Cost Program
Btu	British thermal unit
CBECS	Commercial Building Energy Consumption Survey
CEP	Central Energy Plant
CF	compact fluorescent
d	day
DEH	Directorate of Engineering and Housing
DEIS	Defense Energy Information System
DFSC	Defense Fuel Supply Center
DHW	domestic hot water
DOE	Department of Energy
DOD	Department of Defense
DOS	disk operating system
DSM	demand-side management
EE	energy efficient
EEF	energy efficient ballast
EEM	energy efficient motor
EIA	Energy Information Administration
ELC	electronic ballast
EMCS	energy management control system
EPA	Environmental Protection Agency
ERO	energy resource opportunity
EUI	energy-use intensity
FEMP	Federal Energy Management Program
FO2	fuel oil No. 2
FORSCOM	Forces Command
g	gram
gal	gallon
GPC	Georgia Power Company
h	hour
hp	horsepower
HPS	high pressure sodium
HTHW	high temperature hot water
HVAC	heating, ventilation, and air conditioning
Hz	Hertz
IES	Illuminating Engineering Society of North America
IRA	Integrated Resource Assessment
kBtu	thousand British Thermal Unit
kcf	thousand cubic feet

kVA	kilovolt-amperes
KVAR	reactive demand, kilovolt-amperes
kW	kilowatt
kWh	kilowatthour
lb	pound
LCC	life-cycle cost
LED	light emitting diode
LPS	low pressure sodium
LST	local standard time
LTSM	Lighting Technology Screening Matrix
M	million
mo	month
MBtu	million British thermal unit
MH	metal halide
MW	megawatt
MWh	megawatthour
NBS	National Bureau of Standards
NG	natural gas or National Guard
NIST	National Institute of Standards and Technology
NPV	net present value
O&M	operations and maintenance
°F	degrees Fahrenheit
PCBs	polychlorinated biphenyls
PCF	permanent compact fluorescent
PNL	Pacific Northwest Laboratory
psi	pounds per square inch
PX	post exchange
RECS	Residential Energy Consumption Survey
REF	parabolic reflector
ROI	return on investment
RPL	real property list
RTU	rooftop unit
rpm	revolutions per minute
SERC	Southeastern Electric Reliability Council
SIR	savings to investment ratio
V	volt
VI	value index
W	watt
WSEO	Washington State Energy Office
yr	year

1.0 Physical Characteristics

This section provides an overview of the site and facilities and a summary of the climate and the physical and functional characteristics that influence energy use at Fort Stewart.

1.1 Site Profile

Fort Stewart is a 279,270-acre Forces Command (FORSCOM) facility in eastern Georgia. The main cantonment area is situated just north of Hinesville, Georgia, at 31.52°N and 81.37°W and at an elevation [at the nearby Wright Army Air Field (AAF) runway] of 88 ft. The Fort Stewart reservation encompasses portions of Bryan, Evans, Liberty, Long, and Tattnall counties in southeast Georgia (Figure 1.1). Most of the reservation (221,700 of the 279,270 acres) is unimproved and heavily wooded.

1.1.1 Occupancy

The Fort mission is support of the 24th Infantry Division (Mechanized). Other tenants include the 92nd Engineer Battalion, 260th Quartermaster Battalion, and the 224th Military Intelligence Battalion. In addition, there is a large National Guard Training Center that occupies many of the buildings on what was the original fort.

The daytime population on the Fort averaged 36,548 in FY 1990. Active military personnel assigned to the Fort numbered 26,775; the estimated number of military dependents was 21,508. 8,570 military personnel and dependents live at the Fort, with the remainder living in nine nearby off-post towns. An estimated 41,600 reservists (weekend and annual) trained at Fort Stewart facilities in FY 1991. Civilians employed full-time at the site numbered 3,093 in FY 1991. These personnel did not live in military housing. Active and retired military personnel not assigned to the site affect energy consumption to some extent by their use of site facilities such as the PX and recreation centers. There are some 24,800 military retirees (and dependents) within a 50-mile radius who are entitled to use the facilities.

1.1.2 Climate

Fort Stewart lies within an climate zone where summers are hot and humid and winters mild. Heating degree-days, based on a 65°F balance point, average 1,713 Fahrenheit degree-days/yr; and cooling degree days, also based on a 65°F balance point, average 2,414 Fahrenheit degree-days/yr. There is significant precipitation, an average of 49.7 inches, almost half of which falls during the summer months of June through September.

Design conditions according to *Engineering Weather Data* (TM 5-785) are as follows: the 97.5% and 99% design temperatures for the Fort Stewart weather station are 23 and 26°F. Dry bulb temperature exceeds 80°F an average of 1,352 hr/yr, and exceeds 93°F for 83 hr/yr. Wet bulb temperature exceeds 67°F an average of 3,283 hr/yr, and exceeds 73°F an average of 1,772 hr/yr.

1.1.3 Facilities Overview

Commercial, industrial, and command buildings number 1,041 with a total floor area of 6,416,368 ft². Most of these buildings are located in a 16,981-acre area (the main cantonment) at the extreme south-central area of the reservation. This area is laid out in a broad "V" shape, with the bottom of the "V" pointed at Hinesville to the south. The National Guard (NG) Training Center is on the east side on the "V" and consists of 595 buildings with a combined area of 1,272,659 ft².

There are 21 permanent on-post family housing areas containing a total of 2,440 family dwelling units with a total floor area of 3,323,618 ft². Family housing areas are located north of the NG area and north of the west side of the "V." These 21 housing areas have a mix of energy types for space and domestic water heating; both gas and electric cooking appliances are used in these areas. A mobile home park provides space, electrical service, water, and sewer service for 86 units.

Figure 1.1. Ft. Stewart Map

There are several training areas located apart from the main cantonment that have small numbers of buildings. Table 1.1 details the number of buildings and total building area at each of these areas.

1.2 Building and Facility Profile

The site facilities at Fort Stewart consist of family housing, commercial and industrial buildings (that will henceforth be referred to simply as “buildings”), and other real property improvements such as utilities (water, sewer, streetlights, gas, steam, and electricity), mission-specific facilities (antennas, runways, fuel storage tanks, etc.), outdoor recreation (tennis courts, outdoor pool, etc.), and other surface improvements (streets, culverts, fences, and parking lots).

All of the major non-vehicular energy-using facilities have been classified using 38 primary building types and six utility categories.

1.2.1 Buildings

The building types are based on identifiable function or uniqueness in terms of factors that affect energy use. These factors include occupancy, connected load mix, age, and operation. A building may be treated as two or more buildings, each of a different type, when significant portions of its floor area serve different functions. This may cause some confusion as to the number

of buildings or the fuels available to a building. For example, there is a building type labelled “STOR-UH-1”. “STOR-UH” is defined as unconditioned storage, yet the “-1” implies that it has central plant heat. This is an anomaly in the Building Definition process due to the fact that the unconditioned storage is part of a larger building served with central plant heat. There is no energy use attributed to space conditioning for any of the unconditioned storage building types.

The real property database for Fort Stewart includes Department of Defense (Army version) “category codes” by which to identify building types. Some category codes describe buildings that are very similar in terms of energy use. Groups of codes have therefore been aggregated into higher-level building-type categories for this assessment. The abbreviations used for each aggregate building type and a brief definition of each type are listed in Table 1.2. There are a total of 110 building types.

Building subtypes have been identified where significant differences in style of construction, age, hours of operation, fuel types, or connected load mix result in significant differences in energy-use intensity. For example, administration buildings with natural gas heat form one subtype, those with central plant heat another, and those with central plant heat and cooling a third subtype.

Table 1.1. Training Areas Apart from the Main Cantonment

Area/Block	Number of Buildings	Total Area, ft ²
Wright AAF, 7700 Block	36	63,482
Evans Heliport, 19100 Block	14	62,429
Camp Oliver, 15000 Block	31	33,972
Tac-X, 19200 Block	34	50,426
Taylor’s Creek, 16000 Block	9	4,437
ASP, 17000 Block	36	74,192
Holbrook Pond, 8300 Block	11	8,559
Totals	171	297,497

Table 1.2. Building Type Abbreviations and Definitions

Building Type	Description
ADMIN	Administration Building
ADMIN-2	Admin. Bldg. w/Central Plant Heat and Cool
ADMIN-3	Admin. Bldg. w/Fuel Oil Heat
ADMIN-4	Admin. Bldg. - All Electric
ADMIN-5	Admin. Bldg. - Unheated
ADMIN-6	Admin. Bldg. w/Propane
BRK/ADM	Barracks (enlisted & BOQ)
BRK/ADM-2	Barracks w/Central Plant Heat and Cool
BRK/ADM-3	Barracks w/Fuel Oil Heat
BRK/ADM-6	Barracks w/Propane
CHAPEL	Chapel
CHAPEL-2	Chapel w/Central Plant Heat and Cool
CHAPEL-3	Chapel w/Fuel Oil Heat
CHAPEL-6	Chapel w/Propane
CLINIC	Medical/Dental Clinic
CLINIC-2	Medical/Dental Clinic w/Central Plant Heat and Cool
CLINIC-6	Medical/Dental Clinic w/Propane Heat
CLUB	Club (NCO, Officers, etc.)
CLUB-3	Club w/Fuel Oil Heat
COMCATN	Communications
COMCATN-3	Communications w/Fuel Oil Heat
COMCATN-4	Communications - All Electric
COMCATN-5	Communications - Unheated
COMCATN-6	Communications w/Propane
CONFMT	Confinement Facility
DET-RR	Detached Restrooms, Latrines, Showerhouses, etc.
DET-RR-3	Detached Restrooms w/Fuel Oil Heat
DET-RR-5	Detached Restrooms - Unheated
DET-RR-6	Detached Restrooms w/Propane
DGR	Dry Goods/Retail

Table 1.2. (contd)

Building Type	Description
DGR-2	Dry Goods/Retail w/Central Plant Heat and Cool
DGR-3	Dry Goods/Retail w/Fuel Oil Heat
DGR-6	Dry Goods/Retail w/Propane
DINING	Dining Facility
DINING-2	Dining Facility w/Central Plant Heat and Cool
DINING-3	Dining Facility w/Fuel Oil Heat
DINING-6	Dining Facility w/Propane
FUELDSP	Fuel Dispensing Bldgs.
FUELDSP-5	Fuel Dispensing Bldgs. - Unheated
GROCERY	Grocery
HANGAR-3	Hangar w/Fuel Oil Heat
HANGAR-6	Hangar w/Propane
HOSPITL-2	Hospital w/Fuel Oil Heat
HOTEL	Hotel/Motel/Guesthouse
HSG-FAM	Family Housing
HSG-FAM-4	Family Housing w/Heat Pump
HSG-FAM-6	Family Housing w/Propane
HUT-5	Misc. Small Bldgs. - Unheated
LAB-MED-3	Lab. w/Fuel Oil Heat
LAB-MED-6	Lab. w/Propane
LAUNDRY	Laundry (Wash/Dry & Dry Clean)
LAUNDRY-1	Laundry w/Central Plant Heat
LAUNDRY-6	Laundry w/Propane
MTRPOOL	Maint. Shops for Cars, Trucks, Tanks - Land Vehicles
MTRPOOL-1	Motorpool w/Central Plant Heat
MTRPOOL-3	Motorpool w/Fuel Oil Heat
MTRPOOL-5	Motorpool - Unheated
MTRPOOL-6	Motorpool w/Propane
MWR	Morale, Welfare, and Recreation Facilities
MWR-1	MWR w/Central Plant Heat
MWR-3	MWR w/Fuel Oil Heat

Table 1.2. (contd)

Building Type	Description
MWR-4	MWR - All Electric
MWR-5	MWR - Unheated
MWR-6	MWR w/Propane
OTHER	Other (non ECO bldgs.)
OTHER-5	Other - Unheated
OTHER-6	Other w/Propane
PLT-BLDG	Heating/Cooling/Power Plant, Elec. Distribution Buildings
PLT-BLDG-3	Plant Bldg. w/Fuel Oil Heat
PLT-BLDG-4	Plant Bldg. - All Electric
PLT-BLDG-5	Plant Bldg. - Unheated
PLT-BLDG-6	Plant Bldg. w/Propane
PUMP	Pump Bldgs. - Sewer, Wells, Wash Platforms, etc
PUMP-5	Pump Bldg. w/o Heat
PUMP-6	Pump bldg. w/Propane
REC	Physical Recreation (gym, bowling alley, etc)
REC-1	REC w/Central Plant Heat
REC-2	REC w/Central Plant Heat and Cool
REC-3	Rec w/Fuel Oil Heat
RESTRNT	Restaurant
RESTRNT-3	Restaurant w/Fuel Oil Heat
RESTRNT-6	Restaurant w/Propane
SCHOOL	Dependent Schools
SCHOOL-3	School w/Fuel Oil Heat
SCHOOL-6	Schhol w/Propane
SECURTY	Security Operations (police, fire)
SECURTY-3	SECURTY w/Fuel Oil Heat
SECURTY-6	Security Operations w/Propane
SHOP	General Maint. Shops
SHOP-3	General Maint. Shops w/Fuel Oil Heat
SHOP-AIR-3	Maint. Shops for Aircraft w/Fuel Oil Heat
SHOP-ELC	Maint. Shops for Electronics

Table 1.2. (contd)

Building Type	Description
SHOP-ELC-3	Maint. Shops for Electronics w/Fuel Oil Heat
SHOP-HVY	Maint. Shops w/Heavy Equip.
SHOP-WPN-3	Maint. Shops for Weapons w/Fuel Oil Heat
SIMULTR-3	Simulator Bldg. w/Fuel Oil Heat
STOR-UH	Unheated Storage (vehicles, ammo)
STOR-UH-1	STOR-UH w/Central Plant Heat
STOR-UH-5	Unheated Storage
TRAING	Training/Classrooms (not simulator)
TRAING-2	Training w/Central Plant Heat and Cool
TRAING-3	Training w/Fuel Oil Heat
TRAING-5	Training - Unheated
TRAING-6	Training w/Propane Heat
WHS	Warehouse
WHS-1	Warehouse w/Central Plant Heat
WHS-3	Warehouse w/Fuel Oil Heat
WHS-5	Warehouse - Unheated
WHS-6	Warehouse w/Propane
WHS-CLD	Cold Storage Warehouse
WHS-CLD-5	Cold Storage Warehouse - Unheated
<p>Note: Bldg type subscripts are defined as follows:</p> <p>-1 = Bldg with central plant heat</p> <p>-2 = Bldg with central plant heat and chilled water</p> <p>-3 = Bldg with fuel oil heat</p> <p>-4 = Bldg with electric heat (either elec. resistance as heat pump)</p> <p>-5 = Bldg without heat</p> <p>-6 = Bldg with propane heat</p>	

Table 1.3 lists the important characteristics of aggregate floor area, fuel type, and number of structures for each building type represented at Fort Stewart. It is broken down into National Guard and non-National Guard buildings since the National Guard is financially responsible for all maintenance and operations (energy) costs for this area.

Table 1.4 gives the age distribution of buildings by building type. The year of construction was found in the Real Property List.

1.2.2 Family Housing Characterization

Permanent family housing at Fort Stewart is located in twenty-one areas, each containing an assortment of buildings ranging from single-family to eight-unit rowhouse/townhouse structures. There is also variety in the unit floor plans of the housing stock, with the number of bedrooms ranging from two to four, and the floor area ranging from 750 to 3,714 square feet. The family housing is broken down in a number of ways. The area number (i.e., "area 1") defines a separate group of housing that are similar in floor plan and age. The phase defines a group of areas that were built during the same time frame. For utility billing purposes, the housing areas in the main cantonment (all but areas 10 and 21) are also compiled into blocks named after the number of units in each block. For example, housing areas 1-8 and 11 encompass 713 family housing units, for billing purposes it is called the "713 units". Table 1.5 details the family housing areas by phase, area number, number of dwelling units, number of buildings, energy types, and year of construction as found in the real property database. Table 1.6 lists the housing areas in each utility billing block.

In addition to the permanent housing, there is a mobile home park with space for 86 units. Heat and hot water are provided by bottled propane. The mobile homes are not candidates for energy conservation or fuel switching measures under this program because they are neither owned by nor permanently situated on the Fort. The mobile homes are, however, included in the baseline

analysis since their energy use must be accounted for to avoid biasing the baseline estimates for other buildings.

1.2.3 Central Thermal System Characterization

High temperature hot water (HTHW) and chilled water are distributed by a predominantly underground network of insulated pipe and conduit to approximately 150 buildings. There are approximately 5 miles of buried pipe for HTHW and 4 miles of pipe for chilled water.

HTHW is supplied from two energy sources, both at the Fort Stewart Central Energy Plant (CEP): wood chips and oil. Chilled water is provided by both steam absorption and electric centrifugal chillers, also located at the CEP. The boilers are fueled by wood chips, #2 fuel oil, and waste oil (used motor oil and other lubricating oils).

1.2.4 Utility Characterization

Utilities at the Fort include high temperature hot water (HTHW), central chilled water, electricity, natural gas, domestic water, and sewer.

The distribution temperature and pressure for HTHW heating is 400°F and 230 psig. The distribution temperature and pressure for chilled water is 45°F and 85 psig. Each building on the loop has a heat exchanger for space heating and a heat exchanger for domestic water heating. Modulating valves control the flow of steam to control temperature on the load side. Chilled water is usually piped directly through the building. There are 96 buildings that are supplied HTHW and chilled water from the CEP, and an additional 22 buildings that receive HTHW only.

Electrical service is provided by Georgia Power Company to the substation located off Hero Road. The maximum electrical distribution capacity is 60 megawatts (MW). Primary electrical distribution voltage is 24.94 KVA. There is approximately 115,686 KVA of transformer capacity at Fort Stewart, of which 39,541 KVA is pole mounted (usually between 10 to 100 KVA) and

Table 1.3. Building Characteristics by Building Type

Building Type	No.	Area, ft ²	National Guard No.	National Guard Area, ft ²	Total No.	Total Area, ft ²	Percent of Total
ADMIN	32	125,398	113	159,559	145	284,957	2.62
ADMIN-2	37	659,147			37	659,147	6.05
ADMIN-3	41	280,251	1	2,360	42	282,611	2.50
ADMIN-4	1	2,366			1	2,366	0.02
ADMIN-5	2	240			2	240	<0.01
ADMIN-6	17	79,158	1	2,640	18	81,798	0.75
BRK/ADM	1	37,902	192	497,600	193	535,502	4.91
BRK/ADM-2	33	1,277,790			33	1,277,790	11.73
BRK/ADM-3	11	34,887	38	93,298	49	128,185	1.18
BRK/ADM-6	2	6,200			2	6,200	0.06
CHAPEL	2	4,768			2	4,768	0.04
CHAPEL-2	2	19,554			2	19,554	0.18
CHAPEL-3	1	660	1	3,536	2	4,196	0.04
CHAPEL-6	1	960			1	960	0.01
CLINIC			1	4,176	1	4,176	0.04
CLINIC-2	3	37,724			3	37,724	0.35
CLINIC-6	2	4,321			2	4,321	0.04
CLUB	2	63,475			2	63,475	0.58
CLUB-3	2	24,549			2	24,549	0.23
COMCATN	2	1,560			2	1,560	0.01
COMCATN-3	2	6,927			2	6,927	0.06
COMCATN-4	1	2,800			1	2,800	0.03
COMCATN-5	17	5,460			17	5,460	0.05
COMCATN-6	2	5,749			2	5,749	0.05
CONFMT	1	960			1	960	0.01
DET-RR	3	2,537	94	97,047	97	99,584	0.91
DET-RR-3	2	1,998			2	1,998	0.02
DET-RR-5	52	13,428			52	13,428	0.12
DET-RR-6	6	4,482			6	4,482	0.04

Table 1.3. (contd)

Building Type	No.	Area, ft ²	National Guard No.	National Guard Area, ft ²	Total No.	Total Area, ft ²	Percent of Total
DGR	6	25,851	2	5,826	8	31,677	0.29
DGR-2	1	10,120			1	10,120	0.09
DGR-3	2	71,560			2	71,560	0.66
DGR-6	2	4,086			2	4,086	0.04
DINING	1	897	62	221,396	63	222,293	2.04
DINING-2	6	78,062			6	78,062	0.72
DINING-3	2	9,987	5	17,920	7	27,907	0.26
DINING-6	10	17,104			10	17,104	0.16
FUELDSP	1	1,764	2	251	3	2,015	0.02
FUELDSP-5	46	9,084			46	9,084	0.08
GROCERY	1	90,261			1	90,261	0.83
HANGAR-3	1	9,604			1	9,604	0.09
HANGAR-6	1	7,406			1	7,406	0.07
HOSPITL-2	1	333,938			1	333,938	3.06
HOTEL	4	36,610			4	36,610	0.34
HSG-FAM	612	3,034,374			612	3,034,374	27.85
HSG-FAM-4	58	287,500			58	287,500	2.64
HSG-FAM-6	1	1,744			1	1,744	0.02
HUT-5	30	28,694			30	28,694	0.26
LAB-MED-3	2	6,176			2	6,176	0.06
LAB-MED-6	1	1,274			1	1,274	0.01
LAUNDRY	1	798			1	798	0.01
LAUNDRY-1	1	28,880			1	28,880	0.27
LAUNDRY-6	1	2,750			1	2,750	0.03
MTRPOOL	21	160,340	10	15,663	31	176,003	1.62
MTRPOOL-1	15	426,358			15	426,358	3.91
MTRPOOL-3	12	300,135	2	6,254	14	306,389	2.81
MTRPOOL-5	28	14,132			28	14,132	0.13
MTRPOOL-6			1	1,800	1	1,800	0.02

Table 1.3. (contd)

Building Type	No.	Area, ft ²	National Guard No.	National Guard Area, ft ²	Total No.	Total Area, ft ²	Percent of Total
MWR	9	52,341	23	33,910	32	86,251	0.79
MWR-1	2	37,280			2	37,280	0.34
MWR-3	6	53,575	3	26,587	9	80,162	0.74
MWR-4	4	11,768			4	11,768	0.11
MWR-5	13	1,917			13	1,917	0.02
MWR-6	6	22,798			6	22,798	0.21
OTHER	7	7,544			7	7,544	0.07
OTHER-5	2	1,058			2	1,058	0.01
OTHER-6	2	2,453			2	2,453	0.02
PLT-BLDG	16	28,621			16	28,621	0.26
PLT-BLDG-3	1	650			1	650	0.01
PLT-BLDG-4	3	1,028			3	1,028	0.01
PLT-BLDG-5	3	1,708			3	1,708	0.02
PLT-BLDG-6	1	140			1	140	<0.01
PUMP	6	112,691	1	504	7	113,195	1.04
PUMP-5	32	8,348			32	8,348	0.08
PUMP-6	1	2,006			1	2,006	0.02
REC	2	59,743			2	59,743	0.55
REC-1	1	20,597			1	20,597	0.19
REC-2	2	41,501			2	41,501	0.38
REC-3	3	71,310			3	71,310	0.65
RESTRNT	2	4,285	1		3	4,285	0.04
RESTRNT-3	1	4,600			1	4,600	0.04
RESTRNT-6	1	1,280			1	1,280	0.01
SCHOOL	7	85,610			7	85,610	0.79
SCHOOL-3	2	6,707			2	6,707	0.06
SCHOOL-6	6	52,358			6	52,358	0.48
SECURTY	3	13,179			3	13,179	0.12
SECURTY-3	1	6,153			1	6,153	0.06

Table 1.3. (contd)

Building Type	No.	Area, ft ²	National Guard No.	National Guard Area, ft ²	Total No.	Total Area, ft ²	Percent of Total
SECURTY-6	1	3,417			1	3,417	0.03
SHOP	6	39,285			6	39,285	0.36
SHOP-3	3	11,600			3	11,600	0.11
SHOP-AIR-3	1	31,210			1	31,210	0.29
SHOP-ELC	3	13,642			3	13,642	0.13
SHOP-ELC-3	1	975			1	975	0.01
SHOP-HVY	1	3,636			1	3,636	0.03
SHOP-WPN-3	1	14,050			1	14,050	0.13
SIMULTR-3	1	5,000			1	5,000	0.05
STOR-UH	103	114,693			103	114,693	1.05
STOR-UH-1	1	2,949			1	2,949	0.03
STOR-UH-5	29	32,249			29	32,249	0.30
TRAINING	17	105,823	14	27,217	31	133,040	1.22
TRAINING-2	11	126,980			11	126,980	1.17
TRAINING-3	15	46,032	1	2,892	16	48,924	0.45
TRAINING-5	4	2,156			4	2,156	0.02
TRAINING-6	8	23,244			8	23,244	0.21
WHS	86	501,651	24	48,384	110	550,035	5.05
WHS-1	1	2,620			1	2,620	0.02
WHS-3	6	40,297	1	594	7	40,891	0.38
WHS-5	77	37,014			77	37,014	0.34
WHS-6	9	32,764	1	2,125	10	34,889	0.32
WHS-CLD	1	400			1	400	<0.01
WHS-CLD-5	1	15,604			1	15,604	0.14
Totals	1,680	9,625,280	594	1,271,539	2,274	10,896,819	

Table 1.4. Age Distribution (Count and Floor Area, ft²) by Building Type

Building Type	1940-1949		1950-1959		1960-1969		1970-1979		1980-1991	
	No.	Area, ft ²	No.	Area, ft ²	No.	Area, ft ²	No.	Area, ft ²	No.	Area, ft ²
ADMIN	38	90,218	2	12,838	89	125,111	6	16,994	10	39,796
ADMIN-2			1		4	123,875	24	411,925	9	123,347
ADMIN-3	22	195,151	2	1,814	10	22,253	3	30,536	5	32,857
ADMIN-4	1	2,366								
ADMIN-5									2	240
ADMIN-6	9	33,772	2	7,062	4	7,102			3	33,862
BRK/ADM	2	2,461			107	273,989	83	221,150	1	37,902
BRK/ADM-2					3	133,830	24	911,736	6	232,224
BRK/ADM-3	4	15,912	1	2,000	44	110,273				
BRK/ADM-6	1	5,400					1	800		
CHAPEL									2	4,768
CHAPEL-2							1	10,225	1	9,329
CHAPEL-3	1	3,536					1	660		
CHAPEL-6			1	960						
CLINIC					1	4,176				
CLINIC-2							2	18,869	1	18,855
CLINIC-6			1	480			1	3,841		
CLUB	1	11,842							1	51,633
CLUB-3							1	4,248	1	20,301
COMCATN									2	1,560
COMCATN-3			1	5,947	1	980				
COMCATN-4									1	2,800
COMCATN-5			1	63	11	2,037	4	3,280	1	80
COMCATN-6	1	1,339			1	4,410				
CONFMT			1	960						
DET-RR	25	28,158	7	6,898	62	60,063	2	3,240	1	1,225
DET-RR-3					2	1,998				
DET-RR-5	7	2,015	3	2,088	5	997	14	3,490	23	4,838
DET-RR-6	1	136	4	3,482	1	864				
DGR	3	14,217	2	4,310					3	13,150
DGR-2							1	10,120		
DGR-3							2	71,560		
DGR-6			1	1,360			1	2,726		

Table 1.4. (contd)

Building Type	1940-1949		1950-1959		1960-1969		1970-1979		1980-1991	
	No.	Area, ft ²	No.	Area, ft ²	No.	Area, ft ²	No.	Area, ft ²	No.	Area, ft ²
DINING	7	15,760	26	99,013	30	107,520				
DINING-2					1	11,352	3	47,551	2	19,159
DINING-3			5	17,920	2	9,987				
DINING-6			9	15,504			1	1,600		
FUELDSP	2	251							1	1,764
FUELDSP-5	3	1,220	1	100	4	905	1	120	37	6,739
GROCERY							1	90,261		
HANGAR-3					1	9,604				
HANGAR-6					1	7,406				
HOSPITL-2									1	333,938
HOTEL	2	1,910							2	34,700
HSG-FAM			75	500,864	87	268,784	384	1,916,994	66	347,732
HSG-FAM-4									58	287,500
HSG-FAM-6							1	1,744		
HUT-5	4	1,410	1	18,235			11	1,928	14	7,121
LAB-MED-3							2	6,176		
LAB-MED-6	1	1,274								
LAUNDRY									1	798
LAUNDRY-1	1	28,880								
LAUNDRY-6	1	2,750								
MTRPOOL	7	12,886	5	58,056	7	33,779	5	14,105	7	57,177
MTRPOOL-1	1	76,560							14	349,798
MTRPOOL-3	5	31,136	2	44,948			2	41,620	5	188,685
MTRPOOL-5	4	1,121	4	5,442	1	760	6	855	13	5,954
MTRPOOL-6					1	1,800				
MWR	23	34,297			4	15,034	2	10,967	3	25,957
MWR-1							1	15,880	1	21,400
MWR-3	5	49,183					3	29,758	1	1,221
MWR-4	1	1,296					2	7,880	1	2,592
MWR-5			1	464	7	617	5	836		
MWR-6	2	5,254					2	6,434	2	11,110
OTHER	7	7,544								
OTHER-5					1	952			1	106

Table 1.4. (contd)

Building Type	1940-1949		1950-1959		1960-1969		1970-1979		1980-1991	
	No.	Area, ft ²	No.	Area, ft ²	No.	Area, ft ²	No.	Area, ft ²	No.	Area, ft ²
OTHER-6	2	2,453								
PLT-BLDG	6	3,213	1	500	1	240	6	14,551	2	10,117
PLT-BLDG-3	1	650								
PLT-BLDG-4					2	708			1	320
PLT-BLDG-5							1	100	2	1,608
PLT-BLDG-6							1	140		
PUMP	2	644					3	3,306	2	109,245
PUMP-5	6	1,730	3	876	4	1,460	10	1,579	9	2,703
PUMP-6	1	2,006								
REC							2	59,743		
REC-1							1	20,597		
REC-2							1	21,301	1	20,200
REC-3	1	27,329			1	10,656	1	33,325		
RESTRNT					1				2	4,285
RESTRNT-3									1	4,600
RESTRNT-6	1	1,280								
SCHOOL									7	85,610
SCHOOL-3	1	2,383			1	4,324				
SCHOOL-6					5	50,894			1	1,464
SECURTY			1	960					2	12,219
SECURTY-3	1	6,153								
SECURTY-6					1	3,417				
SHOP	4	37,175					1	510	1	1,600
SHOP-3					1	6,920	1	3,000	1	1,680
SHOP-AIR-3					1	31,210				
SHOP-ELC	2	10,042							1	3,600
SHOP-ELC-3					1	975				
SHOP-HVY	1	3,636								
SHOP-WPN-3	1	14,050								
SIMULTR-3									1	5,000
STOR-UH	9	2,951	62	50,858			3	3,377	29	57,507
STOR-UH-1	1	2,949								
STOR-UH-5	9	13,552	1	299	4	8,504			15	9,894

Table 1.4. (contd)

Building Type	1940-1949		1950-1959		1960-1969		1970-1979		1980-1991	
	No.	Area, ft ²	No.	Area, ft ²	No.	Area, ft ²	No.	Area, ft ²	No.	Area, ft ²
TRAINING	17	41,471	1	16,528	1	2,640	6	63,629	6	8,772
TRAINING-2					2	15,797	8	99,308	1	11,875
TRAINING-3	1	2,892			11	29,837	4	16,195		
TRAINING-5									4	2,156
TRAINING-6	3	15,520			2	3,404	3	4,320		
WHS	57	314,548	3	11,767	5	10,806	18	61,805	27	151,109
WHS-1									1	2,620
WHS-3	3	18,249	1	594	1	3,888			2	18,160
WHS-5	20	14,617	5	1,900	12	3,283	7	1,867	33	15,347
WHS-6	7	24,864			1	400			2	9,625
WHS-CLD	1	400								
WHS-CLD-5	1	15,604								
Totals:	351	1,259,612	236	895,090	550	1,529,821	680	4,328,762	457	2,883,534
% of Total	15.44	11.56	10.38	8.21	24.19	14.04	29.9	39.73	20.1	26.46

Table 1.5. Family Housing Characterization

Phase	Housing Area	No. of Units	No. of Bldgs	Floor Area, ft ²	Energy Type ^(a)				Year Built
					Heating	Cooling	Stove	DHW	
1	5	68	34	113,152	G	E	E	E	1958
	6	320	40	385,992	G	E	E	E	1958
2	3	63	32	90,779	G	E	E	E	1960
	7	10	5	12,220	G	E	E	E	1960
3	1	16	8	24,296	G	E	G	G	1965
	4	16	16	29,971	G	E	G	G	1965
	8	100	30	123,040	G	E	G	G	1965
4	2	10	5	13,570	G	E	G	G	1970
	9	109	33	128,877	G	E	G	G	1970
	10	1	1	1,744	G	E	G	G	1970
5	11	168	42	228,944	G	E	E	E	1976
	12	232	58	297,460	E	E	E	E	1976
6	13	5	5	14,396	G	E	G	G	1978
	14	202	52	317,734	G	E	G	G	1978
	15	224	58	348,264	G	E	G	G	1978
	16	120	31	189,724	G	E	G	G	1978
	17	200	100	379,954	G	E	G	G	1978
7	18	132	33	185,928	E	E	E	E	1980
8	19	64	14	54,400	E	E	E	E	1983
	20	136	30	158,551	E	E	E	E	1983
9	22	101	20	97,824	E	E	E	E	1984
	23	143	24	136,312	E	E	E	E	1985
Totals		2,440	671	3,323,618					
(a) E = Electricity; G = Natural Gas.									

Table 1.6. Family Housing Area Blocks

Block/"Units"	Housing Area
713 Units	1 - 8 and 13
400 Units	9, 11 and 12
750 Units	14 - 17
132 Units	18
200 Units	19 - 20
244 Units	22 - 23

76,145 KVA is pad mounted (from 25 to 37,000 KVA). According to Fort Stewart exterior electric shop personnel, approximately 50 of the transformers are less than 10 years old, and the remainder are around 20 years old. There are 1,360 miles of overhead distribution line and 813 miles of underground line.

There are currently seven feeders serving Fort Stewart. Feeder 1 covers the "new" housing areas; Feeder 2 covers Wright AAF, the south half of the NG area, and the rest of the east side of the main cantonment; Feeders 3, 5, and 7 cover the west side of the main cantonment, including most of the barracks, commercial and industrial areas; Feeder 4 covers the "old" housing area; Feeder 6 serves the north half of the NG area and the trailer court.

The distribution of aggregate building floor area by building type and feeder is given in Table 1.7.

There are approximately 3,000 streetlights (including pole-mounted security lights for parking areas, etc.) at Fort Stewart. According to exterior electric shop personnel, these are broken out as follows: 15% 175 W mercury vapor, 63%

150-400 W high pressure sodium (HPS), 12% 55-135 W low-pressure sodium (LPS) and 10% 1,000-1,500 W metal halide (MH). There is a long-range project underway to replace HPS with LPS on failure of the existing lamps.

The total streetlighting load, including ballasts, is about 626 kW, corresponding to an annual energy use of about 2,740,566 kWh. The lamp circuits are typically controlled by photocells.

Natural gas is provided by Atlanta Gas Light Company (AGL) through a 4 inch, 300 psi pipeline to the propane-air station located south of the Post Headquarters. The gas is then delivered to the buildings at 40 psi through government owned service lines. There are approximately 490 family housing buildings and 210 commercial buildings with natural gas service.

The propane-air station is designed to provide an alternative or back-up fuel for natural gas in the event of a natural gas curtailment. The station also allows Fort Stewart to take advantage of lower cost interruptible gas rates.

Domestic water is supplied by a number of wells scattered across the Fort. Well location, pump size, and storage capacity are shown in Table 1.8. The tank and booster pumps are designed to maintain pressure and reserve water during intensive flow through fire hydrants.

The Hinesville/Fort Stewart Regional Sewage Facilities process effluent from the base's sewage collection system. These facilities are owned by the city of Hinesville, but are located on Fort Stewart, on Hero Road near the substation. The sewage collection network at Fort Stewart consists of 18 lift stations. Table 1.9 summarizes the sewage lift pump characteristics.

Table 1.7. Floor Area (ft²) by Building Type and Electrical Distribution Feed

Building Type	Area Fdr 1	Area Fdr 2	Area Fdr 3	Area Fdr 4	Area Fdr 5	Area Fdr 6	Area Fdr 7	Area Fdr Unknown
ADMIN	4,180	117,573	50,464		24,927	64,959		22,854
ADMIN-2		54,792	211,520		369,173		23,662	
ADMIN-3	2,418	166,277	54,378		38,261			21,277
ADMIN-4								2,366
ADMIN-5							240	
ADMIN-6		37,348	37,106	7,152				192
BRK/ADM		193,723				341,779		
BRK/ADM-2		199,908	392,283		685,599			
BRK/ADM-3		80,900				25,560		21,725
BRK/ADM-6		5,400						800
CHAPEL	4,192							576
CHAPEL-2			9,329		10,225			
CHAPEL-3		3,536						660
CHAPEL-6								960
CLINIC		4,176						
CLINIC-2			22,483		15,241			
CLINIC-6					3,841			480
CLUB		63,475						
CLUB-3					24,549			
COMCATN			1,560					
COMCATN-3		5,947						980
COMCATN-4								2,800
COMCATN-5	80	1,040	1,920					2,420
COMCATN-6		4,410						1,339
CONFMT		960						
DET-RR	1,225	61,692				36,667		
DET-RR-3								1,998
DET-RR-5		991	672		416	186		11,163
DET-RR-6		1,274	136					3,072
DGR	3,150	15,826	8,391		2,250			2,060
DGR-2					10,120			
DGR-3					71,560			
DGR-6				2,726				1,360
DINING		117,460				103,936		897

Table 1.7. (contd)

Building Type	Area Fdr 1	Area Fdr 2	Area Fdr 3	Area Fdr 4	Area Fdr 5	Area Fdr 6	Area Fdr 7	Area Fdr Unknown
DINING-2		19,159	27,450		31,453			
DINING-3		17,920						9,987
DINING-6								17,104
FUELDSP		75				176	1,764	
FUELDSP-5		1,698	1,700		1,878		2,743	1,065
GROCERY					90,261			
HANGAR-3		9,604						
HANGAR-6		7,406						
HOSPITL-2		333,938						
HOTEL		34,700				1,910		
HSG-FAM	2,104,837			929,537				
HSG-FAM-4	287,500							
HSG-FAM-6								1,744
HUT-5		1,200			210			27,284
LAB-MED-3			6,176					
LAB-MED-6		1,274						
LAUNDRY	798							
LAUNDRY-1			28,880					
LAUNDRY-6				2,750				
MTRPOOL	2,675	13,083	104,719		33,705	7,200	8,591	6,030
MTRPOOL-1		30,063	132,074		36,279		227,942	
MTRPOOL-3	19,282	36,807	39,277		208,575		2,448	
MTRPOOL-5			2,073		6,338		771	4,950
MTRPOOL-6		1,800						
MWR	11,000	35,386	20,760	14,957	1,183	2,965		
MWR-1		21,400	15,880					
MWR-3		35,631		20,730	22,580			1,221
MWR-4								11,768
MWR-5					600	464		853
MWR-6		4,554		720	10,390			7,134
OTHER		7,080	464					
OTHER-5			1,058					
OTHER-6		2,453						
PLT-BLDG		3,144	16,259		636	70	7,617	895

Table 1.7. (contd)

Building Type	Area Fdr 1	Area Fdr 2	Area Fdr 3	Area Fdr 4	Area Fdr 5	Area Fdr 6	Area Fdr 7	Area Fdr Unknown
PLT-BLDG-3			650					
PLT-BLDG-4								1,028
PLT-BLDG-5					988			720
PLT-BLDG-6		140						
PUMP		644		688	2,522		109,245	96
PUMP-5		985	2,117	870	963	1,412	360	1,641
PUMP-6			2,006					
REC				59,743				
REC-1					20,597			
REC-2		20,200	21,301					
REC-3		33,325		37,985				
RESTRNT				2,790	1,495			
RESTRNT-3					4,600			
RESTRNT-6		1,280						
SCHOOL	85,610							
SCHOOL-3	2,383			4,324				
SCHOOL-6	52,358							
SECURTY		10,432	2,747					
SECURTY-3		6,153						
SECURTY-6		3,417						
SHOP	510		37,175		1,600			
SHOP-3	3,000	6,920			1,680			
SHOP-AIR-3								31,210
SHOP-ELC			10,042		3,600			
SHOP-ELC-3		975						
SHOP-HVY			3,636					
SHOP-WPN-3			14,050					
SIMULTR-3					5,000			
STOR-UH		2,615	7,018		57,843	10,800		36,417
STOR-UH-1		2,949						
STOR-UH-5		11,717	10,974		2,655		6,232	671
TRAINING	2,052	29,017	5,017	12,237	1,440		1,920	81,357
TRAINING-2			39,547		87,433			
TRAINING-3		5,294	17,635					25,995

Table 1.7. (contd)

Building Type	Area Fdr 1	Area Fdr 2	Area Fdr 3	Area Fdr 4	Area Fdr 5	Area Fdr 6	Area Fdr 7	Area Fdr Unknown
TRAINING-5								2,156
TRAINING-6		11,180	9,184		2,880			
WHS	7,314	77,255	424,901		17,703	10,507	11,200	1,155
WHS-1							2,620	
WHS-3		4,482	16,910		8,000			11,499
WHS-5	60	10,400	8,019	120	1,061		2,800	14,554
WHS-6		10,025	22,186					2,678
WHS-CLD		400						
WHS-CLD-5			15,604					
Totals	2,594,624	2,004,888	1,857,731	1,097,329	1,922,310	608,591	410,155	401,191
% of Total	23.81	18.4	17.05	10.07	17.64	5.59	3.76	3.68

Table 1.8. Water Well Pumps and Storage Tanks

Location/Facility No.	Motor Size (hp)	Pump Capacity (gpm)	Storage Capacity (gal)
Well #1, P-933	200	1,925	None
Well #2, P-456	125	1,375	None
Well #3, P-1345	125	1,400	None
Well #4, T-9961	125	1,400	3 tanks: 1,050,000
Well #5, P-4524	100	1,100	250,000
Wright AAF, T-7731	50	500	8,000
Wright AAF, T-7732	40	500	None
Wright AAF Reservoir	100	N/A	N/A
Taylors Creek, T-16009	50	500	8,000
Camp Oliver, T-15003	30	320	12,000
Tac X, S-19222	10	175	5,000
Evans, T-19107	10	190	150,000
New ASP, P-17006	7.5	60	600
Holbrook, P-8338	3	80	315
Campground, P-8331	3	80	315
Brittin School	15	N/A	None
Multipurpose Range	50	525	None
N/A: data not available			

Table 1.9. Sewer Lift Pump Inventory

Facility No./Location	No. of Pumps	Motor Size (hp)	Capacity (gpm)
203	2	3	350 ea.
459	N/A	N/A	800
899	4	10	570 ea.
1071	1	2	200
1206	2	.5	750
1412	2	7.5	150 ea.
1727	2	10	N/A
1835	2	2	139
2151	3	3	50
5014,16,18,20: at treatment plant	N/A	N/A	approx. 1,890
5028	2	5	500 ea.
6599	2	10	750 ea.
6800	2	5	175 ea.
6875	2	15	350 ea.
7199	2	2	150 ea.
7699	2	25	1150 ea.
9599	1	3	200
10499	2	1.5	350 ea.

2.0 Energy Source Characteristics

This section describes the sources of energy, how energy is delivered and what it costs for fiscal year 1990.

Table 2.1 summarizes typical yearly consumption for each form of energy. The total consumption values are based on the FY90 Defense Energy Information System (DEIS) report. Fuel oil #5 is no longer used at Fort Stewart, but an equal amount (in MBtu's) of fuel oil #2 and/or wood chips are consumed instead of #5 oil. The numbers presented are considered representative of normal base operational energy consumption.

2.1 Electric Supply Source Description

The main electrical service is provided to the substation by Georgia Power Company (GPC) on two main 115-kV lines (30 MVA each) that feed from Hinesville. Billing records for a typical year (FY 1990) indicate on-post use of 149,500 MWh

Table 2.1. Typical Yearly Energy Consumption for FY 1990 (from DEIS Report)

Energy Source	Yearly Total	Yearly Total (MBtu)	Percent of Total
Electricity	149,500 MWh	510,244	2435.99
Natural Gas	1,439 ktherms	143,900	10.15
Fuel Oil #2	486 kgallons	67,510	4.76
Fuel Oil #5	546 kgallons	80,020	5.64
Propane	174 kgallons	15,842	1.12
Wood Chips	66,700 tons	600,300	42.34
Totals		1,417,816	100.00
Energy Conversions General: 1,000,000 Btu/MBtu Electricity: 3,413 Btu/kWh Natural Gas: 100,000 Btu/therm; 1,050 Btu/ft ³ #2 Fuel Oil: 0.1388 MBtu/gal #5 Fuel Oil: 0.1466 MBtu/gal Propane: 0.0913 MBtu/gal Wood Chips: 9 MBtu/ton			

at a blended cost of 4.71 cents/kWh, for a total annual cost of \$7,040,000.

All electricity is billed under the GPC rate structure designated 'Schedule G-10'. The current rate structure is as follows.

2.1.1 Monthly Rate

Base Charge: \$55.00

All consumption (kWh) not greater than 300 hours times the billing demand:

First 50,000 kWh @ \$0.0600/kWh
 Next 150,000 kWh @ \$0.0582/kWh
 Next 800,000 kWh @ \$0.0442/kWh
 Over 1,000,000 kWh @ \$0.0410/kWh

All consumption in excess of 300 hours times the billing demand at \$0.0115/kWh.

Fuel Cost Recovery (FCR): The amount calculated at the above rate is increased by a fuel cost recovery factor as specified by the effective Fuel Cost Recovery Schedule. For 1992, this charge was an additional \$0.01347/kWh.

The billing demand is based on the highest 30-minute kW measurement during the current month and the preceding eleven months. For the billing months of June through September, the billing demand is the greater of

- The current actual demand
- Ninety five percent (95%) of the highest actual demand occurring in any previous summer month (June through September)
- Sixty percent (60%) of the highest demand occurring in any previous winter month (October through May).

For the billing months of October through May, the billing demand is the greater of

- Ninety five percent (95%) of the highest summer month (June through September), or,
- Sixty percent (60%) of the highest winter month (October through May), including the current month.

For the purposes of the ERO analysis in Volume 3, the energy charge is calculated as \$0.025 per kWh and \$8.85 per kW. This takes into account that since Fort Stewart has such a high electric consumption, all of the electric savings will be in the highest rate block. There are 12 diesel generators at the Fort with 50 KVA or greater capacity for a total capacity of 2,245 kW. The generators of 500 kW or greater capacity have an aggregate capacity of 1,060 kW. The generators of 100 to 499 kW capacity have an aggregate capacity of 775 kW. Generators are currently used to provide emergency power for critical buildings and for sewage lift stations and other critical utility functions. There is, however, a project under way (by the Corps of Engineers) to adapt the hospital backup generators for use in peak shaving. The generators are listed in Table 2.2.

2.2 Natural Gas Supply Source Description

Atlanta Gas Light supplies natural gas to Fort Stewart under Large Commercial Interruptible Service Contract Rate I-24. The rate is as follows:

Customer Charge	\$250/month
Firm Service Charge	\$130/therm/month
Commodity Charge:	
First 100,000 therms/month	\$0.073/therm
Next 200,000 therms/month	\$0.063/therm
Over 300,000 therms/month	\$0.052/therm
Base Take or Pay	\$0.096/therm

Natural gas is delivered at 300 psig by Atlanta Gas Light to a regulator and metering station near the propane-air mixing plant. It is distributed across the main cantonment from there at 40 psig.

Table 2.2. Diesel Generators of 50 KVA or Greater Capacity

Building No.	Building Description	Generator Capacity (KVA)
P-00350	Hospital	530
P-00350	Hospital	530
P-01412	Central Energy Plant	250
P-06875	Sewage Lift	175
S-00354	Elec. Gen. Plant Bldg.	175
S-00354	Elec. Gen. Plant Bldg.	175
S-NSS02	Elec. Gen. Plant Bldg.	80
P-00899	Sewage Lift	75
P-01239	Elec. Gen. Plant Bldg	75
P-00009	Tel. Exchange	60
T-00336	Old Hospital	60
T-05001	Sewage Treatment Plant	60
Total		2,245

Natural gas is used primarily for space heating and domestic hot water (DHW) in the family housing areas and provides fuel to small package boilers isolated from the central distribution system. Gas is also used for cooking in most of the dining facilities, such as clubs, mess halls, and restaurants. There are eight gas meters for reimbursable accounts and two meters for the family housing areas. A propane-air mixing plant located onsite provides backup to the natural gas service in the event of an interruption, as well as allows the Fort to use lower cost interruptible gas rates. The propane-air station has recently been enlarged to provide 48 hours of operation per year (134 MBtu/hr) for the entire Fort.

According to the FY90 DEIS report, natural gas consumption was 1,430,000 therms (143,900 MBtu) at an average cost of \$0.545/therm for a total cost of \$779,000. Natural gas represents 9.9% of the non-transport energy use on the base.

To determine the cost of gas for the economic analysis of energy resource opportunities (Volume 3 of this report), the effect of the propane-air station must be taken into account. A full analysis of the marginal cost of natural gas (Stucky and Shankle 1993) resulted in a marginal cost of \$0.30 per therm assuming a total propane usage of 42,278 gallons annually.

2.3 Oil Supply Source Description

Fuel oil is primarily used at the central energy plant to produce steam for both heating and cooling. In FY 1990, both #2 and #5 fuel oils were used. Since then, #5 oil use has been completely eliminated (although some may be kept at the plant for emergency backup). There are also a number of buildings not connected to the central system that use #2 oil for heat and domestic hot water.

The FY 1990 DEIS report lists the following fuel oil deliveries and costs: 486,423 gallons of #2 fuel oil (67,510 MBtu) at an average price of \$0.56/gallon (\$4.03/MBtu) for an annual cost of \$272,232. An additional 545,925 gallons of #5 fuel oil (80,020 MBtu) was used at an average price of \$0.545/gallon (\$3.72/MBtu) for an annual cost of \$297,421. Since it is impossible to determine the amount of fuel oil in storage tanks at the beginning and end of the year, it is assumed that all fuel oil delivered during FY 90 was used. Fuel oil use represents 4.7 and 5.5 percent (#2 and #5 fuel oils, respectively) of the non-transport energy on the Fort.

Fuel oil is supplied through the Defense Fuel Supply Center (DFSC) via delivery order. Sellers Oil of Bainbridge, Georgia, has been the DFSC designated supplier. Delivery is by tanker truck directly to individual tanks. Fuel oil supplied to the CEP for backup use is supplied separately by Petroleum Sources of Atlanta.

An unknown quantity of waste oil generated at the Fort is also burned at the CEP. This oil is primarily used motor oil and other lubricants from the Fort's extensive tactical vehicle fleet.

2.4 Propane Supply Source Description

In FY 1990, 173,512 gallons of propane (18,193 MBtu) was used at Fort Stewart at an average price of \$0.443/gallon (\$4.22/MBtu) for an annual cost of \$76,800. Propane is used for space and domestic water heating and cooking in the mobile home park, as well as in a number of buildings remote from the central distribution system. Propane represents 3.1% of non-transport energy used on Fort.

Propane is delivered by tanker truck to individual tanks on the Fort. The supplier was Huntsville Gas, but their contract recently expired. The Directorate of Contracting is currently nearing contract award for a new supplier.

2.5 Wood Chip Supply Source Description

Wood chips are burned to produce steam in the main steam plant. Annual wood chip use is 66,700 tons (600,300 MBtu) at an average price of \$8.70/ton (\$0.966/MBtu), for a total cost of \$580,000 per year. Wood chips represent 41.5% of non-transport energy used on the Fort. While this accounts for a major portion of the energy use, the actual energy derived from the wood chips is much lower due to combustion inefficiencies.

Wood chips are delivered to the Fort using truck and trailer. T.S.H. Hardwood Inc. of Statesboro is the current supplier of wood chips.

3.0 Electrical Consumption

Metered electrical use data form the primary basis for baseline energy-use intensity (EUI) estimates. The data from existing meters and the data obtained specifically for this project by monitoring equipment installed by PNL at Fort Stewart are summarized and discussed in this section.

3.1 Metering and Data Summary

There were three sources of electric metering and consumption data at Fort Stewart: utility company meter readings, meter readings from selected buildings, and PNL substation feeder monitoring.

Most of the buildings owned or occupied by agencies that are required to pay their utilities (e.g., AAFES facilities such as the Commissary and PX, and tenants, such as the NG Training Center and dependent schools) have meters that are read monthly.

Monthly Georgia Power Company (GPC) electric billing data for service provided at the substation June 1988 through December 1992 are shown below in Table 3.1. Also included are the monthly demand peaks and monthly excess reactive demand numbers. This data was used to reconcile the initial estimates of energy use by building type with the actual electric consumption. GPC also provided (electronically) daily 30-minute demand readings for 1991 and 1992. The data was plotted (see Figures 3.1 to 3.4 in Section 3.2.1) to determine daily, monthly and seasonal demand peaks for ERO analysis.

Individual building meter readings are limited to buildings housing reimbursable activities and large "blocks" of family housing. Most of the reported data for family housing is based on engineering estimates of typical consumption for each of the family housing blocks. Due to the lack of actual meter readings, these estimates were assumed to accurately portray the electric consumption.

The meter readings were used to improve EUI estimates for building types that share feeders with one or more individually metered buildings. Electrical consumption for each of these buildings is listed in Table 3.2. Electric consumption in the family housing areas are listed in Table 3.3. For utility billing purposes, the housing areas in the main cantonment (all but areas 10 and 21) are compiled into blocks named after the number of units in each block. For example, housing areas 1-8 and 11 encompass 713 family housing units, for billing purposes it is called the "713 units."

The most complete set of data is shown in all cases; this may result in data from different time periods, as detailed in the tables.

Between March 3, 1990, and September 30, 1990, PNL installed temporary metering of each feeder in the Fort Stewart substation. Fifteen-minute kilowatt, current, and voltage readings were recorded and transmitted (daily, via modem) back to PNL for analysis. This data has been compiled into average daily weekday and weekend profiles for each month of metering. This metering is the only available data that breaks down the total base consumption by feeder. A summary of all of the buildings on each feeder (Table 1.7) can be used to reconcile the energy use for a particular building type on each feeder. Monthly feeder consumption was used in refining the EUIs assigned to each building type. The results of these metered data analysis activities are presented in Sections 3.2 and 9.

3.2 Electrical Demand Summary

Time-of-use data are needed to assess peak-shaving and demand-limiting measures as well as the demand consequences of other measures.

3.2.1 Time-of-Use Characterization

The average weekday time-of-use profiles are plotted for each month from January 1992 through December 1992 (from the GPC 30-minute demand

Table 3.1. Georgia Power Company Electric Meter Readings

			— Demand —		Reactive Demand		
Year	Month	Energy (kWh)	Billing (kW)	Actual (kW)	Actual (RKVA)	Excess (XRKVA)	Billing Amount
1988	J	15,187,200	29,280	29,280	15,164	5,404	\$618,065
	A	16,185,600	28,646	28,646	15,054	5,505	\$638,686
	S	14,976,000	28,090	28,090	14,211	4,848	\$603,429
	O	10,368,000	27,816	23,501	12,061	4,227	\$483,730
	N	9,062,400	27,816	18,394	8,214	2,083	\$449,878
	D	9,984,000	27,816	19,123	6,651	277	\$472,877
1989	J	10,771,200	27,816	18,566	6,219	30	\$492,872
	F	9,235,200	27,816	19,334	6,995	550	\$478,679
	M	11,308,800	27,816	20,736	6,840	0	\$541,908
	A	9,062,400	27,816	19,546	8,159	1,644	\$481,811
	M	11,750,400	27,816	25,037	10,996	2,650	\$554,756
	J	14,745,600	27,816	27,206	12,072	3,003	\$635,829
	J	13,516,800	27,590	27,590	12,537	3,340	\$600,819
	A	14,707,200	28,301	28,301	12,881	3,447	\$638,944
	S	Data Not Available					
	O						
	N						
	D						
1990	J	11,827,200	26,886	18,758	6,873	620	\$551,293
	F	9,100,800	26,886	18,125	7,061	1,019	\$471,748
	M	10,540,800	26,886	19,814	8,502	1,897	\$516,966
	A	9,446,400	26,886	20,122	8,536	1,829	\$487,454
	M	12,691,200	26,886	27,763	12,726	3,472	\$574,644
	J	15,763,200	30,739	30,739	14,333	4,087	\$690,053
	J	15,859,200	30,067	30,067	13,746	3,724	\$686,862
	A	18,086,400	30,586	30,586	14,466	4,271	\$751,293
	S	12,825,600	29,202	27,072	13,202	4,178	\$597,978
	O	11,328,000	29,202	23,136	10,808	3,096	\$571,039
	N	8,832,000	29,202	16,205	6,917	1,515	\$500,304
	D	9,043,200	29,202	16,423	5,587	113	\$498,147
1991	J	8,870,400	29,202	16,454	5,775	290	\$493,515
	F	8,640,000	29,202	16,090	6,052	689	\$484,393
	M	8,236,800	29,202	15,994	6,285	954	\$462,101

Table 3.1. (contd)

Year	Month	Energy (kWh)	— Demand —		Reactive Demand		Billing Amount
			Billing (kW)	Actual (kW)	Actual (RKVA)	Excess (XRKVA)	
1988	J	15,187,200	29,280	29,280	15,164	5,404	\$618,065
	A	11,558,400	29,202	22,771	9,844	2,254	\$567,342
	M	12,921,600	29,202	27,360	12,316	3,196	\$605,274
	J	13,977,600	29,088	29,088	12,892	3,196	\$632,961
	J	17,452,800	29,894	29,894	13,590	3,625	\$698,154
	A	17,875,200	30,259	30,259	13,890	3,804	\$711,903
	S	14,457,600	28,746	27,648	12,604	3,388	\$613,222
	O	11,616,000	28,746	24,787	11,163	2,901	\$554,081
	N	9,907,200	28,746	22,387	9,755	2,293	\$514,718
	D	11,001,600	28,746	20,006	7,937	1,268	\$541,577
1992	J	12,192,000	28,746	21,619	7,050	0	\$564,905
	F	9,772,800	28,746	20,275	6,596	0	\$504,403
	M	10,195,200	28,746	19,219	7,128	722	\$515,142
	A	10,022,400	28,746	20,083	8,580	1,886	\$511,142
	M	10,348,800	28,746	24,288	10,786	2,690	\$519,624
	J	14,726,400	28,746	28,051	12,548	3,198	\$629,060
	J	16,646,400	30,144	30,144	13,568	3,520	\$689,456
	A	16,147,200	29,376	29,376	12,837	3,045	\$669,984
	S	14,611,200	28,781	28,781	12,493	2,899	\$626,334
	O	10,732,800	28,637	26,515	11,861	3,023	\$528,271
	N	9,427,200	28,637	20,506	8,680	1,845	\$495,332
	D	11,404,800	28,637	19,277	7,150	724	\$544,396

Table 3.2. Electric Meter Readings for Reimbursable Facilities, FY 1990

Bldg	Description	FY-1990, kWh
00453	PX Office	82,080
00419	PX Mall	1,974,000
00430	Service Station	119,926
NA	Vending	835,615
09634	Doghouse	20,288
00706	PX	205,440
00417	Shoppette	120,560
07336	Bryan shoppette	282,000
00451	PX Laundry	21,301
NA	Laundry	19,771
00455	Burger King	270,980
00704	Popeye's	399,992
NA	POV Car Wash	26,000
00416	Fort Stewart Fed Credit Union	111,720
04951	Washers & Dryers	20844
NA	Package Shops	51,840
02150	Golf Course	288,779
00402	Bowling Alley	876,480
08041	Stables	15,995
08332	Skeet Range	5,400
05601	Stewart Elem School	596,194
00418	Post Office	60,996
01152	O&MF Support of PDO	123,360
00936	Resident Engineer	73,105
08099	Fort Stewart Riding Clug	1,380
00415	Banking Facilities	95,735
04951	Billeting Association	555,108
00421	Commissary Facilities	3,851,100

Table 3.3. Family Housing Electric Meter Readings, FY 1991

Date	132 Units kWh	200 Units kWh	244 Units kWh
Oct 90	144,054	235,475	287,469
Nov 90	131,714	211,475	255,120
Dec 90	130,000	330,000	399,578
Jan 91	180,814	313,044	380,295
Feb 91	171,589	278,867	343,552
Mar 91	178,464	203,600	248,392
Apr 91	134,749	218,727	265,842
May 91	157,502	216,143	262,683
Jun 91	307,235	301,000	363,120
Jul 91	206,863	327,242	407,040
Aug 91	239,350	390,836	484,968
Sep 91	179,887	280,838	354,270
FY 1991	2,162,221	3,307,247	4,052,329
	400 Units kWh	713 Units kWh	749 Units kWh
Oct 90	733,628	781,000	875,840
Nov 90	728,750	778,800	670,104
Dec 90	676,600	710,000	593,600
Jan 91	739,611	710,000	713,797
Feb 91	794,000	779,900	671,400
Mar 91	557,200	778,800	744,000
Apr 91	555,800	995,400	820,600
May 91	676,600	1,207,000	1,037,400
Jun 91	788,000	1,352,800	1,180,800
Jul 91	827,400	1,472,420	1,319,400
Aug 91	827,400	1,472,100	1,330,200
Sep 91	711,000	1,400,000	1,177,600
FY 1991	8,615,989	12,438,220	11,134,741

readings) in Figure 3.1. The corresponding weekend profiles are plotted in Figure 3.2.

As shown in the figures, there is a definite difference between the summer months and the

rest of the year. The top four lines in each figure are for the months June through September. The rest of the year shows generally consistent consumption.

The weekday and weekend profiles are very similar between 2000 and 0200 Local Standard Time (LST) because the nighttime loads consist mainly of exterior lighting, standby loads (due, e.g., to compressed air standby losses), HVAC fans and pumps that run continuously, and other equipment that runs continuously including many computers, controllers, and plug-in appliances.

The monthly average weekday-minus-weekend load difference profiles are shown in Figure 3.3. The weekday profiles differ from the weekend profiles in having a much larger additional load which peaks at about 8 a.m., and then tapers off as the day continues, until about 4 p.m., when it drops off sharply (corresponding to the end of the work day). Street and exterior lights operated by time clocks and photocells have absolutely no systematic effect on the weekday-weekend difference profile.

3.2.2 Consumption, Peak Demand and Reactive Demand Growth

Figure 3.4 shows the variation in electrical load from June 1988, through December 1992. Billing data are plotted by billing month. A billing month ends on the meter reading day of the month indicated on the horizontal axis of Figure 3.4. Meter reading days fall between the 21st and 27th of the month and are always a weekday. As shown in Table 3.1, data for September through December 1989 is not available.

Figure 3.4 shows a steady load profile with little change over the last several years. The summer months (generally June through September) are the peak consumption and demand periods due to the hot, humid climate and subsequent air conditioning operation.

3.2.3 Load Curves

Monthly histograms of electric demand for the Fort are useful for determining the electrical energy that would have to have been generated to

Figure 3.1. Monthly Average Weekday Electric Load Profiles

Figure 3.2. Monthly Average Weekend Electric Load Profiles

Figure 3.3. Monthly Average Weekday-Minus-Weekend Electric Load Profiles

Figure 3.4. Georgia Power Company Billing Data, July 1988 - December 1992

limit the peak demand to any specified value. The relation between kWh (that must be generated) and kW shaved is plotted for each month (in which peak shaving could have taken place) in Figure 3.5. These data are limited to the months when PNL monitoring equipment was in place and functioning at the Fort Stewart substation. Due to the GPC rate schedule in place at Fort Stewart, peak shaving would be cost effective in the summer months only, as the winter demand is much lower than 95% of the summer peak.

The relation between kWh and kW shaved is estimated for a year in Figure 3.6. Also shown in Figure 3.6 are the relation between full-load-equivalent run hours and kW shaved and the relation between total run hours and kW shaved. As noted above, peak shaving would occur in the summer only, with the possibility of a large reduction in the *billing* peak by peak shaving for a short period. This information is used to estimate savings for measures such as peak shaving by operation of existing diesel generators.

Figure 3.5. Monthly Peak Shaving Energy Cost Component. (The minimum energy (kWh) that must be generated each month is presented as a function of reduction in the monthly maximum 15-minute demand (kW). First costs are associated with the aggregate capacity of generators converted to peak-shaving duty, and operating costs are associated with the energy (kWh) that must be produced at appropriate times to limit demand at the utility meter.)

Figure 3.6. Annual Peak Shaving Energy and Maintenance Cost Components. (Each component--kWh, actual operating hours, and full-capacity equivalent operating hours--is plotted as a function of monthly demand shaved. The curves are based on a control strategy that accurately forecasts each monthly peak and thus provides a specified reduction in monthly demand with the minimum possible operating time and fuel consumption.)

4.0 Natural Gas Consumption

4.1 Metering and Data Summary

Natural gas metering is carried out in the same manner as electrical metering; i.e., for reimbursable accounts and family housing only. Metered data are therefore limited to these buildings and a Fort total. Most of the reported data for family housing is based on engineering estimates of typical consumption for each of the family housing blocks. Since there is no other metered consumption data available, these estimates are assumed to be accurate portrayals of the natural gas consumption.

4.2 Energy Use Breakdown

Natural gas is consumed at Fort Stewart for heat and domestic hot water in 1,462 family housing units, commercial kitchens, and dining facilities. Fiscal year 1991 is the most recent year for which a complete set of data is available. Table 4.1 lists the three reimbursable facilities with metered natural gas, and Table 4.2 lists the two family housing blocks with natural gas.

Table 4.1. Natural Gas Meter Readings for Reimbursable Facilities, FY 1991

Building Number	Description	FY 1991 therms	FY 1991 MBtu
00405	Off/NCO Club	31,629	3,163
00703	EM Club	2,817	282
04951	Billeting Association	6,455	646
00421	Commissary Facilities	9,372	937
Totals		50,273	5,027

The reimbursable facilities and family housing account for 581,207 therms of natural gas. The Fort total consumption is 1,439,000 therms, leaving 857,793 therms used at other buildings where natural gas use is not metered other than at the main meter.

Table 4.2. Natural Gas Meter Readings for Family Housing, FY 1991

Date	713 Units therms	MBtu	749 Units therms	MBtu
Oct 90	5,416	542	11,408	1,141
Nov 90	64,580	6,458	17,010	1,701
Dec 90	62,250	6,225	32,619	3,262
Jan 91	54,627	5,463	52,152	5,215
Feb 91	37,335	3,734	70,870	7,087
Mar 91	22,710	2,271	35,340	3,534
Apr 91	6,877	688	13,055	1,306
May 91	3,603	360	7,039	704
Jun 91	1,965	196	3,690	369
Jul 91	9,828	983	3,298	330
Aug 91	1,769	177	3,326	333
Sep 91	3,537	354	6,624	662
Totals	274,497	27,450	256,431	25,643

5.0 Oil Consumption

5.1 Metering and Data Summary

Heating oil consumption information is available from three sources: family housing, the central energy plant boiler operating logs, and individual delivery records to other buildings. While fuel oil is no longer used in any of the family housing areas, it was used to characterize heating energy consumption, and is therefore reported here. Number 2 fuel oil is currently the only type used at Fort Stewart; however, the central energy plant burned #5 oil through March 1991, then switched to #2, as shown in the table below. Number 5 fuel oil is reported only to the extent that the energy produced from the #5 oil has been replaced with another fuel (#2 oil or wood chips).

Table 5.1. Family Housing Fuel Oil Consumption, FY 1991

Date	713 Units (gal)	713 Units (MBtu)
Oct 90	0	0
Nov 90	9,198	1,277
Dec 90	5,750	798
Jan 91	0	0
Feb 91	13,473	1,870
Mar 91	13,473	1,870
Apr 91	164	23
May 91	0	0
Jun 91	0	0
Jul 91	0	0
Aug 91	0	0
Sep 91	0	0
Totals	42,058	5,838

5.2 Energy Use Breakdown

Fuel oil is used for heating in many buildings in outlying areas away from the main cantonment, including several buildings at Wright AAF, Camp Oliver, and Evans Heliport. It is also used in some older buildings that were built in the 1940s in the post headquarters area, and in a number of the (newer) large vehicle maintenance facilities. Fuel oil is used for domestic hot water only in all of the "shower houses" in the National Guard area. Family housing fuel oil consumption is shown in Table 5.1. As seen in the table, #2 oil was no longer used in family housing after April 1991. Natural gas was used after this date. Central energy plant consumption is shown in Table 5.2. Central plant data were not available for a complete fiscal year, so the most recent complete year is shown. Consumption at individual buildings where fuel oil deliveries are recorded is listed in Table 5.3.

Table 5.2. Central Energy Plant Fuel Oil Consumption, Sept. 1990–Aug. 1991

Date	#5 Oil (Gal)	#5 Oil (MBtu)	#2 Oil (Gal)	#2 Oil (MBtu)
Sep 90	4,800	704		
Oct	103,855	15,225		
Nov	12,515	1,835		
Dec	4,515	662		
Jan 91	23,585	3,458		
Feb	37,925	5,560		
Mar	81,505	11,949		
Apr			26,365	3,659
May			19,780	2,745
Jun			35,000	4,858
Jul			100,690	13,976
Aug 91			65,544	9,098
Totals	268,700	39,391	247,379	34,336

Table 5.3. Individual Building Fuel Oil Consumption, FY 1991

Building Number	Gal #2 Oil (FY 1991)	MBtu #2 Oil (FY 1991)	Building Number	Gal #2 Oil (FY 1991)	MBtu #2 Oil (FY 1991)
00001	6,111	848	01620	7,918	1,099
00004	1,056	147	01630	13,776	1,912
00005	1,105	153	01720	11,684	1,622
00006	569	79	01820	725	101
00008	859	119	05612	790	110
00009	1,300	180	05613	704	98
00105	336	47	06563	363	50
00106	780	108	06570	207	29
00108	541	75	07704	3,163	439
00131	1,225	170	07707	182	25
00132	865	120	07708	284	39
00135	2,756	383	07711	520	72
00153	187	26	07755	542	75
00154	104	14	08081	286	40
00155	78	11	08084	3,307	459
00157	108	15	08340	206	29
00251	9,230	1,281	09181	1,209	168
00285	1,514	210	09591	1,500	208
00287	1,926	267	17003	939	130
00293	2,182	303	17005	347	48
00295	10	1	19101	1,169	162
00350	2,511	349	19102	1,760	244
00402	227	32	19103	3,368	467
00410	1,669	232	19104	1,805	251
00411	1,672	232	19105	6	1
00418	2,854	396	19201	2,514	349
00419	4,576	635	19205	854	119
00449	11,632	1,615	19206	483	67
00450	375	52	19207	345	48

Table 5.3. (contd)

Building Number	Gal #2 Oil (FY 1991)	MBtu #2 Oil (FY 1991)	Building Number	Gal #2 Oil (FY 1991)	MBtu #2 Oil (FY 1991)
00625	3,086	428	19208	430	60
00750	6,315	877	19210/11	22	3
00802	4,122	572	19212	998	139
00810	240	33	19213	390	54
00925	1,248	173	19214	314	44
01002	661	92	19215	381	53
01003	8,073	1,121	19216	460	64
01008	12	2	19218	239	33
01043	3,155	438	19219	61	8
01046	15,853	2,200	19220	24	3
01056	58	8	19223	1,602	222
01070	3,319	461	19224	434	60
01078	112	16	19225	6,626	920
01080	1,718	238	19236	18	2
01245	2,749	382	19238	170	24
01310	1,749	243	FH	28,735	3,988
01312	237	33	Others	2,986	414
01320	5,263	731	Tac-X	5,458	758
Totals	116,328	16,146		110,304	15,310

6.0 Propane Consumption

6.1 Metering and Data Summary

Propane data are available as monthly delivery records to individual buildings located in the main cantonment and buildings or groups of buildings in the outlying training areas. The National Guard area uses propane almost exclusively. Propane deliveries for FY 1991 are summarized in Table 6.1 below.

6.2 Energy Use Breakdown

Propane is used in much the same manner as fuel oil; it is consumed in outlying areas and in 1940s-era buildings around the post headquarters. It is also used at the trailer park. There are several buildings which receive both propane and fuel oil; in these cases, the propane is used either for cooking or for pilot lights in oil-fired equipment. Some National Guard buildings use propane for heat and fuel oil for domestic water heating.

Table 6.1. Propane Deliveries, FY 1991

Building No.	FY 1991 gal	FY 1991 MBtu	Building No.	FY 1991 gal	FY 1991 MBtu
00019	300	27	00933	1,075	98
00020	700	64	01019	1,256	115
00025	1,840	168	01022	3,190	291
00037	1,400	128	01078	2,165	198
00140	690	63	01152	1,475	135
00156	650	59	01310	1,150	105
00201	570	52	01412	1,055	96
00202	230	21	05016	650	59
00282	491	45	05603	6,648	607
00286	1,251	114	07332	200	18
00287	850	78	07703	650	59
00290	740	68	07704	1,650	151
00291	1,450	132	07706	449	41
00292	850	78	07707	946	86
00294	1,625	148	07712	1,125	103
00295	1,215	111	07713	425	39
00300	525	48	07727	90	8
00301	1,385	126	07735	945	86
00306	120	11	07736	700	64

Table 6.1. (contd)

Building No.	FY 1991 gal	FY 1991 MBtu	Building No.	FY 1991 gal	FY 1991 MBtu
00343	425	39	07754	1,980	181
00367	75	7	08041	230	21
00372	775	71	08061	200	18
00376	1,645	150	08071	210	19
00381	2,205	201	08325	20	2
00386	215	20	08402	650	59
00396	505	46	15001	655	60
00398	2,085	190	15011/15012	350	32
00430	1,400	128	15017/15021	135	12
00451	12,069	1,102	15018/15019	250	23
00453	1,200	110	15020	120	11
00454	1,630	149	15027/15034	425	39
00626	5,484	501	15037/15047/15077	1,170	107
00701	1,250	114	19103	960	88
00704	950	87	19104	870	79
00707	250	23	19225	1,800	164
00810	190	17	791/792	460	42
00901	1,595	146	9139/9140	800	73
00916	565	52	Car p Oliver	3,145	287
00922	1,225	112	DEH	6,522	595
00923	1,006	92	Tac-X	1,934	177
00926	540	49	landfill	510	47
			mayor's trailer	770	70
Totals	54,166	4,945		50,010	4,566

7.0 Wood Chip Consumption

7.1 Metering and Data Summary

The wood chip consumption at Fort Stewart was 26,450 ton/yr (648,095 MBtu/yr) in FY 1990. Monthly consumption for FY 1991 is listed in Table 7.1 below. As in the fuel oil records above, a complete fiscal year of data was not available, so the most recent complete year is shown. These numbers are taken from the boiler operating logs (as 1,000s of pounds wood burned) for the central energy plant (CEP) and may differ somewhat from the amount of the deliveries.

There is a large storage yard at the CEP where the wood chips are delivered, and there is undoubtedly some carryover from month to month. There is no information available as to the amount of wood chips stored at the yard.

7.2 Energy Use Breakdown

Wood chips are burned at the CEP to produce steam for heating, domestic hot water, and cooling for buildings on the central distribution system.

Table 7.1. Wood Chip Consumption at the Central Energy Plant, Sept 1990 - Aug 1991^(a)

Date	Wood (Ton)	Wood MBtu
Sept 1990	7,402	666,618
Oct	4,488	40,392
Nov	5,788	52,092
Dec	6,222	55,998
Jan	5,494	46,446
Feb	4,635	41,715
March	7,832	70,488
April	3,388	30,492
May	6,550	58,950
June	7,337	66,033
July	7,686	69,174
Aug 1991	8,258	74,322
TOTAL	75,080	675,720
(a) Energy Conversion = 9 MBtu/ton wood chips.		

8.0 Energy-Use Intensities

This section presents estimates of site-specific energy-use intensities (EUIs) by building type and end use and describes their development. Section 8.1 is a survey of regional end-use studies that report EUIs by building type. Section 8.2 summarizes the EUI data that are relevant to the buildings at Fort Stewart. These data serve as a starting point for the site-specific analysis of Section 8.3. Section 8.4 presents the results of the site-specific disaggregation of whole-building EUI estimates into estimates of energy-use intensity by end use.

8.1 Initial Energy-Use Intensity Data

Energy-use intensities are defined as energy use per unit area per unit time. EUIs are commonly expressed as thousands of Btus per square foot per year (kBtu/ft²-year), or kilowatt hours per square foot per year (kWh/ft²-year).

Tables 8.1 through 8.3 summarize the results of several regional end-use EUI surveys. EUIs are estimated by building type, fuel type, and fuel end use. Energy use is expressed in kWh/ft²-yr for electric EUIs and kBtu/ft²-yr for fossil fuel EUIs. End-use data are for the following end-use categories: space heating, cooling, ventilation, domestic hot water (DHW), cooking, lighting (includes interior and exterior), refrigeration, and "other." The other category was found to cover miscellaneous end uses made up of a variety of electrical appliances and motors as well as water/steam heating for laundry or food preparation. Significant differences in how the surveys defined the "other" category are noted in the tables.

Tables 8.1 through 8.3 present the survey and analysis results reported by the Environmental Protection Agency/Southeastern Electric Reliability Council (EPA/SERC), Georgia Power Company (GPC), Gulf Power Company, and the DOE-EIA RECS (Residential Energy Consumption Survey) and CBECS (Commercial Building Energy

Consumption Survey). The electric end-use results appear in Table 8.1, the natural gas end-use results appear in Table 8.2, and the fuel oil end-use results appear in Table 8.3.

While some of the EUI values correlate very well among the surveys for a given building type, fuel type and end use, other values do not. The largest discrepancy is between the CBECS survey and the other two surveys. In most cases, the CBECS values are lower than the values from the other two surveys, in some cases by a factor of 1/2 to 1/3. There are a number of explanations for these discrepancies.

One possible explanation is that the CBECS data are not specific to one particular utility service territory; rather, the data are for four states that make up the South Atlantic region of the United States.

A second factor contributing to lower CBECS values is the CBECS EUI reporting convention. CBECS reports EUIs by building type and fuel but does not report the proportions of the different fuels used for each end use. The resulting EUIs represent an average of some, but not all, end uses for a given building and fuel type. The CBECS EUIs are therefore expected to be lower than the EUIs that represent all end uses, as is the case for the EUIs reported by EPA and GPC.

Other factors that can contribute to the discrepancies are building age, construction type, occupant density and schedules, and implemented energy conservation measures. All these factors can lead to significant variation in average EUI for a given building type category.

8.2 Energy End-Use Values

A primary product of the energy consumption analysis for Fort Stewart is a set of site-specific EUI values for the building types and end uses at the Fort. The EUIs have been determined from

Table 8.1. Regional Electric EUI Survey Results (kWh/ft²-yr)

Single-Family Residence	Heat	Cool	Vent	DHW	Cook	Light	Ref.	Other	Total
EPA/SERC	5.2	2.15	-	2.55	0.6	-	-	2.6 ^(a)	13.11
GA Power	3.7	1.6	-	2.2	0.54	-	-	3.0 ^(a)	11.04
RECS ^(b)	-	-	-	-	-	-	-	-	10.92
Lodging									
EPA/SERC ^(c)	3.0	4.9	1.4	5.8	6.2	5.3	1.1	2.4	30.1
Gulf Power ^(c)	3.35	5.82	1.15	0.75	0.68	5.17	0.75	4.45	22.12
GA Power ^(d)	2.22	4.02	0.95	0.5	0.34	3.49	1.34	2.72	15.58
CBECS	-	-	-	-	-	-	-	-	15.91
Office									
EPA/SERC	2.2	5.5	2.5	0.8	0.6	6.7	0.3	3.6	22.2
Gulf Power	0.66	3.51	0.7	0.38	0.81	2.98	0.11	1.51	10.66
GA Power	1.64	4.3	3.0	0.7	0.23	8.12	0.24	3.3	21.53
CBECS	-	-	-	-	-	-	-	-	20.07
Grocery									
EPA/SERC	3.7	4.7	3.8	0.8	2.1	15.3	28.7	2.3	61.4
Gulf Power	0.75	10.8	2.49	0.49	0.14	10.73	16.35	2.99	44.74
GA Power	0.32	8.23	2.23	0.69	0.77	13.23	24	2.71	52.18
CBECS	-	-	-	-	-	-	-	-	45.62
Restaurant									
EPA/SERC	2.3	4.3	1.9	3.9	7.2	5.2	5.5	2.1	32.4
Gulf Power	0.83	13.97	3.98	3.55	0.75	5.83	9.63	3.91	42.45
GA Power	0.99	22.52	3.33	2.27	10.82	10.6	17.96	4.6	73.09
CBECS	-	-	-	-	-	-	-	-	28.24
Health									
EPA/SERC	2.7	6.5	2.4	2.5	0.4	5.9	0.6	2.4	23.4
Gulf Power	1.2	8.79	1.97	0.5	1.06	6.28	0.95	4.4	25.15
GA Power	0.97	6.01	2.58	0.42	0.96	7.49	1.54	4.23	24.2
CBECS	-	-	-	-	-	-	-	-	18.99
Retail									
EPA/SERC	2.3	3.1	1.4	0.6	0.9	6.1	0.7	1.4	16.5
Gulf Power	.96	3.95	0.99	0.46	0.01	4.26	1.41	3.51	15.55
GA Power	1.62	4.75	1.8	0.89	0.19	6.75	0.56	2.79	19.35
CBECS	-	-	-	-	-	-	-	-	14.36

Table 8.1. (contd)

Single-Family Residence	Heat	Cool	Vent	DHW	Cook	Light	Ref.	Other	Total
Warehouse									
EPA/SERC	1.9	1.8	1.3	0.6	-	3.8	8.6	1.2	19.2
Gulf Power	-	-	-	-	-	-	-	-	-
GA Power	0.03	1.23	0.73	0.23	0.05	1.95	0.46	0.9	5.58
CBECS	-	-	-	-	-	-	-	-	11.69
School									
EPA/SERC	4.2	1.3	0.6	1.1	2.1	4.2	0.4	0.6	14.5
Gulf Power	0.26	2.99	0.69	0.39	0.26	2.63	0.45	0.71	8.38
GA Power	0.49	1.79	0.76	0.26	0.27	2.79	0.7	1.44	8.5
CBECS	-	-	-	-	-	-	-	-	7.62
College									
EPA/SERC	2.7	1.4	1.1	1.2	2.4	3.3	0.4	1	13.5
Gulf Power	0.1	4.94	1.18	0.53	0.12	5.24	0.73	3.26	16.1
GA Power	0.43	3.7	2.61	0.4	0.54	7.32	0.66	3.93	19.59
CBECS	-	-	-	-	-	-	-	-	-
Miscellaneous Building									
EPA/SERC	4.5	2.7	1.3	0.4	0.7	3.1	0.9	1.3	14.9
Gulf Power	2	12.0	6.92	0.63	0.15	12.2	1.15	11.6	46.66
GA Power	0.23	3.3	1.18	0.28	0.25	3.62	1.07	2.39	12.32
CBECS	-	-	-	-	-	-	-	-	18.4
Assembly									
Gulf Power	0.51	2.27	0.23	0.61	-	2.18	0.02	0.45	6.27
CBECS	-	-	-	-	-	-	-	-	6.47
(a) Defined as miscellaneous EUI, includes lighting, refrigeration, and residual appliances. (b) RECS data are for the South Atlantic region. EUI calculated assumes 1500 ft² per single family residence. (c) EPA/SERC and Gulf Power data are for lodging category. (d) GA Power Data are for hotel/motel category.									

Table 8.2. Regional Natural Gas EUI Survey Results (kBtu/ft²-yr)

Single Family Residence	Heating	DHW	Cooking	Cooling	Other	Total
EPA/SERC	22.6	13.5	5.5	-	-	41.6
RECS	-	-	-	-	-	70.3
Lodging						
EPA/SERC	108.1	24.8	15.2	9.6	3.8	161.5
Gulf Power	5.09	14.52	3.87	0.68	10.27	34.43
GA Power	16.55	16.46	8.36	4.88	14.81	61.06
CBECS	-	-	-	-	-	45.7
Office						
EPA/SERC	46.5	14.6	0.9	277.8	0.6	340.4
Gulf Power	14.92	1.02	-	-	0.38	16.32
GA Power	26.86	5.84	0.31	1.44	3.3	37.75
CBECS	-	-	-	-	-	36.5
Grocery						
EPA/SERC	214.1	57.8	107	147.2	-	526.1
Gulf Power	22.29	0.52	0.31	-	0.55	23.67
GA Power	10.65	2.97	3.27	-	-	16.89
CBECS						
Restaurant						
EPA/SERC	61	35.9	43.4	41.1	-	181.4
Gulf Power	23.44	47.65	0.85	-	0.39	72.33
GA Power	37.94	80.97	90.88	5.1	2.03	216.92
CBECS	-	-	-	-	-	73.4
Health						
EPA/SERC	198.6	40.7	4.2	65.7	8.1	317.3
Gulf Power	30.92	16.43	5.54	0.99	9.68	63.56
GA Power	38.8	17.61	10.99	7.65	9.97	85.02
CBECS	-	-	-	-	-	102.9

Table 8.2. (contd)

Single Family Residence	Heating	DHW	Cooking	Cooling	Other	Total
Retail						
EPA/SERC	43.8	18.6	2.2	67.2	-	131.8
Gulf Power	0.41	0.13	-	-	1.15	1.69
GA Power	20.32	4.13	0.24	0.99	2.02	27.7
CBECS	-	-	-	-	-	41.9
Warehouse						
EPA/SERC	31.3	8.6	-	11.7	1.3	52.9
Gulf Power	-	-	-	-	-	-
GA Power	9.66	3.63	0.34	4.39	-	18.02
CBECS	-	-	-	-	-	-
School						
EPA/SERC	37.3	18.1	4.5	8.4	1.8	70.1
Gulf Power	14.32	3.52	0.09	-	0.24	18.17
GA Power	25.98	10.35	5.78	0.19	2.89	45.19
CBECS	-	-	-	-	-	35.2
College						
EPA/SERC	35.4	14.1	5.1	12.7	2.9	70.2
Gulf Power	33.85	3.43	0.4	-	9.65	47.33
GA Power	22.71	30.08	19.6	0.43	4.2	77.02
CBECS	-	-	-	-	-	-
Miscellaneous Buildings						
EPA/SERC	39.6	7.6	2.6	29.7	3.1	82.9
Gulf Power	0.48	0.38	-	-	3.56	4.42
GA Power	9.87	14.2	7.36	0.91	7.63	39.97
CBECS	-	-	-	-	-	-
Assembly						
Gulf Power	11.84	1.4	0.01	-	0.72	13.97
CBECS	-	-	-	-	-	23.9

Table 8.3. Regional Fuel Oil EUI Survey Results (kBtu/ft²-yr)

Single Family Residence	Heating	DHW	Total
EPA/SERC	22.4	13.4	35.8
RECS	-	-	67.4
Lodging			
EPA/SERC	43.9	29	72.9
Gulf Power	0.01	0.01	0.02
GA Power	0.65	1.73	2.38
Office			
EPA/SERC	37.7	14.7	52.4
Gulf Power	3.65	-	3.65
GA Power	1.18	0.34	1.52
Grocery			
EPA/SERC	47.8	37.6	85.4
Gulf Power	1.94	0.02	1.96
GA Power	0.41	0.5	0.91
Restaurant			
EPA/SERC	5.8	30.6	36.4
Gulf Power	0.05	0.84	0.89
GA Power	-	1.06	1.06
Health			
EPA/SERC	53.2	39.8	93
Gulf Power	0.11	0.03	0.14
GA Power	0.83	0.69	1.52
Retail			
EPA/SERC	41.1	99.4	140.5
Gulf Power	0.1	-	0.1
GA Power	0.92	-	0.92
CBECS	-	-	37.7
Warehouse			
EPA/SERC	89.2	108.4	197.6
GA Power	0.17	-	0.17

Table 8.3. (contd)

Single Family Residence	Heating	DHW	Total
School			
EPA/SERC	78.5	32	110.5
Gulf Power	0.01	-	0.01
GA Power	1.18	0.12	1.3
College			
EPA/SERC	19.2	9.3	28.5
Gulf Power	0.36	-	0.36
GA Power	2	1.58	3.58
Miscellaneous Buildings			
EPA/SERC	56.3	6.8	63.1
GA Power	1.11	0.1	1.21
Assembly			
CBECS	-	-	15.2

aggregate, rather than directly measured, energy deliveries. Some error is inevitable in the separation process; however, these EUI estimates are consistent with all available energy-use records and are consistent with regional estimates of energy use by building type. The estimates are therefore considered to be sufficiently accurate for identifying and ranking energy projects. More detailed connected load inventories of targeted end-use equipment should be obtained in many cases prior to implementing the conservation and efficiency measures recommended in the Volume 3 companion report.

The initial step in estimating site-specific EUIs was to assess all available regional and published EUI data that might be applicable to Fort Stewart (see Section 8.1 for descriptions). After reviewing all sources and matching existing data on building types with Fort Stewart building types, a set of initial EUI values was created. These values provide a range of reasonable EUI values within which the site specific values are expected to fall.

8.3 Energy Use by Building Type

Very few (24) of the buildings at Fort Stewart have electric meters, and even fewer have gas meters. To determine the conservation potential of measures relating to specific end-use equipment, energy use by building type must be estimated. This is straightforward in cases where actual building metering data on building type area metering exist. In other cases, EUI values are derived by an energy balance method. This procedure accounts for all energy use at the Fort while apportioning it as accurately as possible to the various buildings and other uses.

Estimates of energy consumption by building type (based on the EUIs) are presented in Table 8.4. The consumption numbers that are not tied to a specific building (e.g., streetlights) are shown with totals only. The last line item (in the electric column) is the total of loss in the electrical distribution system. Distribution losses are associated with individual buildings roughly in proportion to their energy use. There was insufficient information to break out the National Guard

Table 8.4. Estimated Energy Consumption by Building Type

Building Type	Total Electrical, MWh	Total Natural Gas, MBtu	Total #2 Fuel Oil, MBtu	Total LPG, MBtu
ADMIN	1,887	4,962	0	0
ADMIN-1	641	0	0	0
ADMIN-2	6,175	0	0	0
ADMIN-3	3,960	0	14,541	0
ADMIN-5	2	0	0	0
ADMIN-6	1,394	0	0	4,164
BRK/ADM	350	1,480	0	0
BRK/ADM-2	8,740	0	0	0
BRK/ADM-3	333	0	1,933	0
CHAPEL	24	63	0	0
CHAPEL-2	56	0	0	0
CHAPEL-3	3	0	15	0
CHAPEL-6	22	0	0	162
CLINIC-2	512	0	0	0
CLINIC-6	80	0	0	256
CLUB	1,095	9,814	0	0
CLUB-3	424	1,648	285	0
COMCATN	71	129	0	0
COMCATN-3	112	0	182	0
COMCATN-5	42	0	0	0
COMCATN-6	93	0	0	251
CONFMT	10	37	0	0
DET-RR	27	170	0	0
DET-RR-3	10	0	91	0
DET-RR-5	28	0	0	0
DET-RR-6	21	0	0	266
DGR	431	937	0	0
DGR-2	123	0	0	0
DGR-3	1,183	0	691	0
DGR-6	68	0	0	214

Table 8.4. (contd)

Building Type	Total Electrical, MWh	Total Natural Gas, MBtu	Total #2 Fuel Oil, MBtu	Total LPG, MBtu
DINING	475	2,224	0	0
DINING-2	2,104	5,241	0	0
DINING-3	330	671	768	0
DINING-6	119	0	0	390
FUELDSP	22	31	0	0
FUELDSP-5	65	0	0	0
GROCERY	3,671	2,050	0	0
HANGAR	64	220	0	0
HANGAR-3	83	0	341	0
HOSPITL	73	292	0	0
HOSPITL-1	1,090	0	0	0
HOSPITL-2	4,745	0	0	0
HOSPITL-6	144	0	0	598
HOTEL	566	1,731	0	0
HSG-FAM	30,861	80,579	0	0
HSG-FAM-4	5,047	0	0	0
HSG-FAM-6	18	0	0	60
HUT	95	334	0	0
HUT-5	26	0	0	0
LAB-MED-1	79	0	0	0
LAB-MED-3	94	0	277	0
LAB-MED-6	19	0	0	81
LAUNDRY	6	29	0	0
LAUNDRY-1	208	0	0	0
LAUNDRY-6	19	0	0	1,232
MTRPOOL	2,534	5,301	0	0
MTRPOOL-1	6,535	0	0	0
MTRPOOL-3	4,600	0	7,787	0
MTRPOOL-5	96	0	0	0
MWR	393	870	0	0

Table 8.4. (contd)

Building Type	Total Electrical, MWh	Total Natural Gas, MBtu	Total #2 Fuel Oil, MBtu	Total LPG, MBtu
MWR-1	223	0	0	0
MWR-3	320	0	1,152	0
MWR-5	7	0	0	0
MWR-6	166	0	0	745
OTHER	12	178	0	0
OTHER-5	1	0	0	0
OTHER-6	4	0	0	203
PLT-BLDG	385	670	0	0
PLT-BLDG-3	8	0	13	0
PLT-BLDG-5	14	0	0	0
PUMP	1,049	1,394	0	0
PUMP-5	78	0	0	0
PUMP-6	19	0	0	50
REC	282	791	0	0
REC-1	156	0	0	0
REC-2	196	0	0	0
REC-3	541	0	1,319	0
RESTRNT	290	879	0	0
RESTRNT-3	240	0	146	0
SCHOOL	1,040	3,768	0	0
SCHOOL-3	99	0	225	0
SCHOOL-6	636	0	0	4,151
SECURTY	156	390	0	0
SECURTY-3	73	0	173	0
SECURTY-6	40	0	0	145
SHOP	335	1,212	0	0
SHOP-3	81	0	276	0
SHOP-AIR-3	190	0	467	0
SHOP-ELC	188	438	0	0
SHOP-ELC-3	13	0	52	0

Table 8.4. (contd)

Building Type	Total Electrical, MWh	Total Natural Gas, MBtu	Total #2 Fuel Oil, MBtu	Total LPG, MBtu
SHOP-HVY	53	108	0	0
SHOP-WPN-3	203	0	391	0
SIMULTR-3	96	0	208	0
STOR-UH	552	0	0	0
STOR-UH-1	14	0	0	0
STOR-UH-5	112	0	0	0
TRAIING	605	3,949	0	0
TRAIING-2	535	0	0	0
TRAIING-3	264	0	988	0
TRAIING-5	7	0	0	0
TRAIING-6	123	0	0	977
WHS	3,200	11,309	0	0
WHS-1	203	0	0	0
WHS-3	253	0	800	0
WHS-5	127	0	0	0
WHS-6	206	0	0	1,301
WHS-CLD	4	2	0	0
WHS-CLD-5	175	0	0	0
Sub-Total	105,672	143,900	33,123	15,246
Central Plants	31,000		34,336	
Nat. Guard	4,734			
St. Lights	2,741			
Dist. Loss	7,478			
DEH				595
Total	151,625	143,900	67,459	15,841

natural gas, fuel oil, and propane consumption from the base total, but it is assumed to be small compared with the overall consumption. The line item for DEH in the propane column is assumed to be the amount of propane delivered to the trailer park.

8.4 Energy-Use Intensities by End Use

The energy consumption is allocated within each building type to several primary end uses. This allocation is based on three types of information: 1) the regional EUI estimates, 2) similar reports by PNL for other DoD sites, and 3) site-specific data on equipment characteristics, including hours of operation. The available equipment characteristics data for Fort Stewart included lamp replacement data and fan, pump, and chiller inventory abstracted from the Real Property List database.

Tables 8.5 through 8.8 present the results of the end-use EUI analysis as discussed in Sections 8.1 through 8.3. EUI estimates are given for all of the major end uses and building types that exist at Fort Stewart.

Appearance of zero (0) in the table for a minor end use indicates that the building type in question has too small a component of that end use to be apportioned separately. In such cases, the end-use component appears as part of "other." The absence of energy consumption in major end uses such as heating and dining hall cooking indicates that the end use is not electric. The data provided only indicate rough percentages of penetration of equipment in these housing areas. The floor areas give an indication of the percentage of penetration.

Table 8.5. Electric EUIs by Building Type and End Use (kWh/ft²/yr)

Building Type	Total	Heating	Cooling	Vent/ Fans	DHW	Cook	Refrig	Other	Int. Inc.	Ext. Inc.	Fluor	Int. HID	Ext. HID
ADMIN	14.13	0.00	4.85	2.82	0.00	0.00	0.15	2.55	0.61	0.00	2.98	0.00	0.16
ADMIN-1	14.13	0.00	4.85	2.82	0.00	0.00	0.15	2.55	0.61	0.00	2.98	0.00	0.16
ADMIN-2	9.71	0.00	0.00	2.86	0.00	0.00	0.15	2.59	0.62	0.00	3.02	0.00	0.16
ADMIN-3	14.13	0.00	4.85	2.82	0.00	0.00	0.15	2.55	0.61	0.00	2.98	0.00	0.16
ADMIN-5	6.54	0.00	0.00	0.00	0.00	0.00	0.15	2.59	0.62	0.00	3.03	0.00	0.15
ADMIN-6	14.13	0.00	4.85	2.82	0.00	0.00	0.15	2.55	0.61	0.00	2.98	0.00	0.16
BRK/ADM	9.23	0.00	3.12	0.74	0.00	0.00	0.68	1.72	0.44	0.00	2.40	0.00	0.12
BRK/ADM-2	6.84	0.00	0.00	0.64	0.00	1.32	0.58	1.75	0.38	0.00	2.07	0.00	0.10
BRK/ADM-3	9.53	0.00	2.69	0.64	0.00	1.32	0.58	1.75	0.38	0.00	2.07	0.00	0.10
CHAPEL	5.13	0.00	2.27	0.23	0.00	0.00	0.00	0.45	0.33	0.00	1.77	0.00	0.09
CHAPEL-2	2.86	0.00	0.00	0.23	0.00	0.00	0.00	0.45	0.33	0.00	1.77	0.00	0.09
CHAPEL-3	5.13	0.00	2.27	0.23	0.00	0.00	0.00	0.45	0.33	0.00	1.77	0.00	0.09
CHAPEL-4	5.13	0.00	2.27	0.23	0.00	0.00	0.00	0.45	0.33	0.00	1.77	0.00	0.09
CLINIC-2	13.58	0.00	0.00	2.32	0.00	0.00	1.03	3.68	0.98	0.00	5.31	0.00	0.26
CLINIC-6	18.59	0.00	5.01	2.32	0.00	0.00	1.03	3.68	0.98	0.00	5.31	0.00	0.26
CLUB	17.26	0.00	6.13	1.38	0.00	0.00	4.97	1.59	1.46	0.00	1.58	0.00	0.13
CLUB-3	17.26	0.00	6.13	1.38	0.00	0.00	4.97	1.59	1.46	0.00	1.58	0.00	0.13
COMCATN	16.23	0.00	6.01	2.61	0.00	0.00	0.00	5.09	0.47	0.00	1.92	0.00	0.13
COMCATN-3	16.23	0.00	6.01	2.61	0.00	0.00	0.00	5.09	0.47	0.00	1.92	0.00	0.13
COMCATN-5	7.60	0.00	0.00	0.00	0.00	0.00	0.00	5.09	0.47	0.00	1.92	0.00	0.13
COMCATN-6	16.23	0.00	6.01	2.61	0.00	0.00	0.00	5.09	0.47	0.00	1.92	0.00	0.13
CONFMT	10.48	0.00	2.46	2.00	0.00	0.00	0.80	2.13	0.47	0.00	2.51	0.00	0.12
DET-RR	4.80	0.00	1.31	0.91	0.00	0.00	0.00	0.74	0.28	0.00	1.49	0.00	0.07
DET-RR-3	4.80	0.00	1.31	0.91	0.00	0.00	0.00	0.74	0.28	0.00	1.49	0.00	0.07
DET-RR-5	2.66	0.00	0.00	0.00	0.00	0.00	0.00	0.73	0.35	0.00	1.49	0.00	0.09
DET-RR-6	4.80	0.00	1.31	0.91	0.00	0.00	0.00	0.74	0.28	0.00	1.49	0.00	0.07
DGR	16.68	0.00	4.53	2.69	0.00	0.00	1.42	2.95	0.85	0.00	4.61	0.00	0.23

Table 8.5. (contd)

Building Type	Total	Heating	Cooling	Vent/ Fans	DHW	Cook	Refrig	Other	Int. Inc.	Ext. Inc.	Fluor	Int. HID	Ext. HID
DGR-2	12.12	0.00	0.00	2.16	0.00	0.14	1.38	2.98	0.83	0.00	4.46	0.00	0.18
DGR-3	16.53	0.00	4.42	2.04	0.00	0.14	1.39	3.00	0.83	0.00	4.50	0.00	0.22
DGR-6	16.68	0.00	4.53	2.09	0.00	0.00	1.42	2.95	0.85	0.00	4.61	0.00	0.23
DINING	33.04	0.00	6.09	3.07	0.00	6.26	11.03	3.18	1.08	0.00	2.19	0.00	0.14
DINING-2	26.96	0.00	0.00	3.07	0.00	6.26	11.03	3.18	1.08	0.00	2.19	0.00	0.14
DINING-3	33.04	0.00	6.09	3.07	0.00	6.26	11.03	3.18	1.08	0.00	2.19	0.00	0.14
DINING-6	33.04	0.00	6.09	3.07	0.00	6.26	11.03	3.18	1.08	0.00	2.19	0.00	0.14
FUELDSP	12.33	0.00	2.00	3.13	0.00	0.00	0.00	5.09	0.32	0.00	1.70	0.00	0.08
FUELDSP-5	7.19	0.00	0.00	0.00	0.00	0.00	0.00	5.09	0.32	0.00	1.70	0.00	0.08
GROCERY	40.68	0.00	5.29	2.37	0.00	0.84	19.22	2.23	0.82	0.00	8.16	1.46	0.29
HANGAR	8.61	0.00	1.48	1.54	0.00	0.00	0.00	2.50	0.46	0.00	1.73	0.77	0.12
HANGAR-3	8.61	0.00	1.48	1.54	0.00	0.00	0.00	2.50	0.46	0.00	1.73	0.77	0.12
HOSPITL	19.04	0.00	5.46	2.32	0.00	0.00	1.03	3.68	0.98	0.00	5.31	0.00	0.26
HOSPITL-1	19.70	0.00	5.55	2.31	0.00	0.63	1.01	3.73	0.96	0.00	5.30	0.00	0.20
HOSPITL-2	14.21	0.00	0.00	2.32	0.00	0.63	1.03	3.68	0.98	0.00	5.31	0.00	0.26
HOSPITL-6	19.04	0.00	5.46	2.32	0.00	0.00	1.03	3.68	0.98	0.00	5.31	0.00	0.26
HOTEL	15.45	0.00	5.13	1.58	0.00	0.00	0.96	3.59	0.63	0.00	3.40	0.00	0.17
HSG-FAM	10.14	0.00	4.00	0.70	0.00	0.00	1.38	0.83	2.26	0.32	0.64	0.00	0.00
HSG-FAM-4	17.67	4.50	4.05	0.74	2.54	0.64	1.27	0.87	2.21	0.17	0.68	0.00	0.00
HSG-FAM-6	10.14	0.00	4.00	0.70	0.00	0.00	1.38	0.83	2.26	0.32	0.64	0.00	0.00
HUT	4.20	0.00	0.00	1.25	0.00	0.00	0.00	1.27	0.32	0.00	1.28	0.00	0.08
HUT-5	4.20	0.00	0.00	1.25	0.00	0.00	0.00	1.27	0.32	0.00	1.28	0.00	0.08
LAB-MED-1	15.17	0.00	4.64	1.97	0.00	0.00	0.67	3.60	0.64	0.00	2.40	1.07	0.17
LAB-MED-3	15.17	0.00	4.64	1.97	0.00	0.00	0.67	3.60	0.64	0.00	2.40	1.07	0.17
LAB-MED-6	15.17	0.00	4.64	1.97	0.00	0.00	0.67	3.60	0.64	0.00	2.40	1.07	0.17
LAUNDRY	7.01	0.00	0.00	1.20	0.00	0.00	0.00	2.59	0.48	0.00	2.60	0.00	0.13
LAUNDRY-1	7.19	0.00	0.00	1.23	0.00	0.00	0.00	2.66	0.49	0.00	2.67	0.00	0.13
LAUNDRY-6	7.01	0.00	0.00	1.20	0.00	0.00	0.00	2.59	0.48	0.00	2.60	0.00	0.13
MTRPOOL	15.33	0.00	2.41	2.51	0.00	0.00	0.00	5.09	0.95	0.00	1.77	2.37	0.25
MTRPOOL-1	15.33	0.00	2.41	2.51	0.00	0.00	0.00	5.09	0.95	0.00	1.77	2.37	0.25
MTRPOOL-3	15.33	0.00	2.41	2.51	0.00	0.00	0.00	5.09	0.95	0.00	1.77	2.37	0.25
MTRPOOL-5	10.42	0.00	0.00	0.00	0.00	0.00	0.00	5.09	0.95	0.00	1.77	2.37	0.25
MWR	5.98	0.00	2.53	0.33	0.00	0.00	0.00	0.51	0.47	0.00	2.02	0.00	0.12
MWR-1	5.98	0.00	2.53	0.33	0.00	0.00	0.00	0.51	0.47	0.00	2.02	0.00	0.12
MWR-3	5.98	0.00	2.53	0.33	0.00	0.00	0.00	0.51	0.47	0.00	2.02	0.00	0.12
MWR-5	3.45	0.00	0.00	0.33	0.00	0.00	0.00	0.51	0.47	0.00	2.02	0.00	0.12
MWR-6	5.98	0.00	2.53	0.33	0.00	0.00	0.00	0.51	0.47	0.00	2.02	0.00	0.12
OTHER	1.56	0.00	0.46	0.24	0.00	0.00	0.00	0.39	0.07	0.00	0.39	0.00	0.02
OTHER-5	0.84	0.00	0.00	0.00	0.00	0.00	0.00	0.38	0.07	0.00	0.35	0.00	0.03
OTHER-6	1.56	0.00	0.46	0.24	0.00	0.00	0.00	0.39	0.07	0.00	0.39	0.00	0.02
PLT-BLDG	12.13	0.00	1.50	2.51	0.00	0.00	0.00	5.09	0.47	0.00	0.64	1.80	0.13
PLT-BLDG-3	12.13	0.00	1.50	2.51	0.00	0.00	0.00	5.09	0.47	0.00	0.64	1.80	0.13
PLT-BLDG-5	8.12	0.00	0.00	0.00	0.00	0.00	0.00	5.09	0.47	0.00	0.64	1.80	0.13
PUMP	9.31	0.00	0.00	2.35	0.00	0.00	0.00	5.09	0.47	0.00	1.28	0.00	0.13
PUMP-5	9.31	0.00	0.00	2.35	0.00	0.00	0.00	5.09	0.47	0.00	1.28	0.00	0.13
PUMP-6	9.31	0.00	0.00	2.35	0.00	0.00	0.00	5.09	0.47	0.00	1.28	0.00	0.13
REC	4.72	0.00	0.00	0.65	0.00	0.00	0.06	1.26	0.61	0.00	1.98	0.00	0.16
REC-1	7.59	0.00	2.87	0.65	0.00	0.00	0.06	1.26	0.61	0.00	1.98	0.00	0.16
REC-2	4.72	0.00	0.00	0.65	0.00	0.00	0.06	1.26	0.61	0.00	1.98	0.00	0.16

Table 8.5. (contd)

Building Type	Total	Heating	Cooling	Vent/ Fans	DHW	Cook	Refrig	Other	Int. Inc.	Ext. Inc.	Fluor	Int. HID	Ext. HID
REC-3	7.59	0.00	2.87	0.65	0.00	0.00	0.06	1.26	0.61	0.00	1.98	0.00	0.16
RESTRNT	52.19	0.00	9.23	4.69	0.00	10.20	16.85	5.76	3.67	0.00	1.59	0.00	0.20
RESTRNT-3	52.19	0.00	9.23	4.69	0.00	10.20	16.85	5.76	3.67	0.00	1.59	0.00	0.20
SCHOOL	12.15	0.00	3.09	1.74	0.00	0.00	1.31	2.33	0.61	0.00	2.90	0.00	0.16
SCHOOL-3	14.75	0.00	2.99	1.55	0.00	2.99	1.29	2.29	0.55	0.00	2.95	0.00	0.15
SCHOOL-6	12.15	0.00	3.09	1.74	0.00	0.00	1.31	2.33	0.61	0.00	2.90	0.00	0.16
SECURTY	11.81	0.00	3.01	2.35	0.00	0.00	0.00	3.82	0.47	0.00	2.04	0.00	0.13
SECURTY-3	11.81	0.00	3.01	2.35	0.00	0.00	0.00	3.82	0.47	0.00	2.04	0.00	0.13
SECURTY-6	11.81	0.00	3.01	2.35	0.00	0.00	0.00	3.82	0.47	0.00	2.04	0.00	0.13
SHOP	8.17	0.00	1.94	1.35	0.00	0.00	0.00	2.18	0.41	0.00	1.52	0.68	0.11
SHOP-3	8.17	0.00	1.94	1.35	0.00	0.00	0.00	2.18	0.41	0.00	1.52	0.68	0.11
SHOP-AIR-3	6.10	0.00	1.43	0.75	0.00	0.00	0.00	2.42	0.23	0.00	0.84	0.38	0.06
SHOP-ELC	13.80	0.00	2.75	2.38	0.00	0.00	0.00	3.87	0.72	0.00	2.69	1.20	0.19
SHOP-ELC-3	13.80	0.00	2.75	2.38	0.00	0.00	0.00	3.87	0.72	0.00	2.69	1.20	0.19
SHOP-HVY	14.48	0.00	2.41	1.57	0.00	0.00	0.00	5.09	0.95	0.00	2.65	1.58	0.25
SHOP-WPN-3	14.48	0.00	2.41	1.57	0.00	0.00	0.00	5.09	0.95	0.00	2.65	1.58	0.25
SIMULTR-3	19.26	0.00	6.01	3.13	0.00	0.00	0.00	5.09	0.95	0.00	3.83	0.00	0.25
STOR-UH	4.82	0.00	0.00	1.35	0.00	0.00	0.00	0.70	0.58	0.00	1.07	0.96	0.15
STOR-UH-1	4.82	0.00	0.00	1.35	0.00	0.00	0.00	0.70	0.58	0.00	1.07	0.96	0.15
STOR-UH-5	3.46	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.58	0.00	1.07	0.96	0.15
TRAIING	5.59	0.00	1.51	1.02	0.00	0.00	0.00	0.68	0.36	0.00	1.93	0.00	0.10
TRAIING-2	4.21	0.00	0.00	1.05	0.00	0.00	0.00	0.70	0.37	0.00	1.99	0.00	0.10
TRAIING-3	5.59	0.00	1.51	1.02	0.00	0.00	0.00	0.68	0.36	0.00	1.93	0.00	0.10
TRAIING-5	3.22	0.00	0.00	0.00	0.00	0.00	0.00	0.72	0.38	0.00	2.03	0.00	0.10
TRAIING-6	5.59	0.00	1.51	1.02	0.00	0.00	0.00	0.68	0.36	0.00	1.93	0.00	0.10
WHS	6.28	0.00	1.57	1.05	0.00	0.00	0.00	1.09	0.45	0.00	1.25	0.75	0.12
WHS-1	6.28	0.00	1.57	1.05	0.00	0.00	0.00	1.09	0.45	0.00	1.25	0.75	0.12
WHS-3	6.28	0.00	1.57	1.05	0.00	0.00	0.00	1.09	0.45	0.00	1.25	0.75	0.12
WHS-5	4.31	0.00	0.00	0.00	0.00	0.00	0.00	1.38	0.57	0.00	1.27	0.94	0.15
WHS-6	6.28	0.00	1.57	1.05	0.00	0.00	0.00	1.09	0.45	0.00	1.25	0.75	0.12
WHS-CLD	11.24	0.00	6.06	2.03	0.00	0.00	0.00	1.05	0.86	0.00	0.40	0.72	0.12
WHS-CLD-5	11.24	0.00	6.06	2.03	0.00	0.00	0.00	1.05	0.86	0.00	0.40	0.72	0.12

Table 8.6. Natural Gas EUIs by Building Type and End Use

Building Type	Total	(Btu/ft ² -yr)			
		Heating	DHW	Cooking	Other
ADMIN	37,153	27,955	9,198	0	0
BRK/ADM	39,040	10,820	18,593	0	9,627
CHAPEL	13,240	11,840	1,400	0	0
CLUB	154,615	32,635	54,840	67,140	0
CLUB-3	67,140	0	0	67,140	0
COMCATN	29,598	19,788	9,810	0	0
CONFMT	38,557	10,820	18,593	9,143	0
DET-RR	30,688	19,788	10,900	0	0
DGR	36,264	26,604	9,660	0	0
DINING	154,615	32,635	54,840	67,140	0
DINING-2	67,140	0	0	67,140	0
DINING-3	67,140	0	0	67,140	0
FUELDSP	17,315	17,315	0	0	0
GROCERY	22,710	16,470	2,970	3,270	0
HANGAR	29,745	21,025	8,720	0	0
HOSPITL	75,933	34,860	24,913	6,910	9,250
HOTEL	47,269	10,820	18,593	8,229	9,627
HSG-FAM	26,473	14,044	8,831	3,598	0
HUT	14,841	14,841	0	0	0
LAUNDRY	36,688	21,025	10,900	0	4,763
MTRPOOL	32,072	22,262	9,810	0	0
MWR	13,240	11,840	1,400	0	0
OTHER	23,561	14,841	8,720	0	0
PLT-BLDG	21,088	12,368	8,720	0	0
PUMP	12,368	12,368	0	0	0
REC	13,240	11,840	1,400	0	0
RESTRNT	157,864	34,674	54,840	67,140	1,210
SCHOOL	44,008	25,867	10,657	5,140	2,345
SECURTY	29,598	19,788	9,810	0	0
SHOP	29,598	19,788	9,810	0	0
SHOP-ELC	32,072	22,262	9,810	0	0
SHOP-HVY	29,598	19,788	9,810	0	0
TRAIING	36,523	25,867	10,657	0	0
WHS	22,204	16,089	6,115	0	0
WHS-CLD	5,504	0	5,504	0	0

Table 8.7. Fuel Oil (#2) EUIs by Building Type and End Use

		(Btu/ft ² -yr)	
Building Type	Total	Heating	DHW
ADMIN-3	51,887	26,827	25,061
BRK/ADM-3	55,401	25,209	30,192
CHAPEL-3	23,000	15,000	8,000
CLUB-3	11,625	8,775	2,850
COMCATN-3	26,278	23,023	3,255
DET-RR-3	45,440	16,891	28,549
DGR-3	9,654	261	9,393
DINING-3	76,918	35,108	41,810
HANGAR-3	35,511	30,606	4,905
LAB-MED-3	44,835	20,720	24,115
MOTORPOOL-3	25,944	22,142	3,802
MWR-3	21,500	13,500	8,000
PLT-BLDG-3	20,673	17,223	3,450
REC-3	18,500	13,500	5,000
RESTAURANT-3	31,705	22,124	9,581
SCHOOL-3	33,537	9,011	24,527
SECURITY-3	28,055	24,391	3,664
SHOP-3	27,849	24,399	3,450
SHOP-AIR-3	14,978	13,371	1,607
SHOP-ELC-3	53,051	44,772	8,279
SHOP-WPN-3	27,849	24,399	3,450
SIMULATOR-3	41,665	38,139	3,526
TRAINING-3	20,926	9,805	11,121
WHS-3	19,865	13,375	6,489

Table 8.8. Propane EUIs by Building Type and End Use

Building Type	Total	(Btu/ft ² -yr)			
		Heating	DHW	Cooking	Other
ADMIN-6	42,213	32,084	10,130	0	0
CHAPEL-6	38,309	32,538	5,771	0	0
CLINIC-6	59,147	38,507	20,640	0	0
COMCATN-6	43,667	31,599	12,068	0	0
DET-RR-6	59,277	28,205	31,073	0	0
DGR-6	52,318	32,887	12,644	6,787	0
DINING-6	107,984	30,976	26,026	50,982	0
HOSPITAL-6	79,030	41,314	29,526	8,189	0
HSG-FAM-6	34,290	18,629	11,128	4,534	0
LAB-MED-6	63,545	32,182	31,363	0	0
LAUNDRY-6	448,137	42,933	216,223	0	188,980
MWR-6	26,798	21,673	5,125	0	0
OTHER-6	82,948	57,576	25,372	0	0
PUMP-6	24,735	24,735	0	0	0
SCHOOL-6	79,285	33,052	15,393	30,840	0
SECURITY-6	42,343	30,232	12,111	0	0
TRAINING-6	44,303	31,376	12,927	0	0
WHS-6	39,700	30,536	9,163	0	0

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