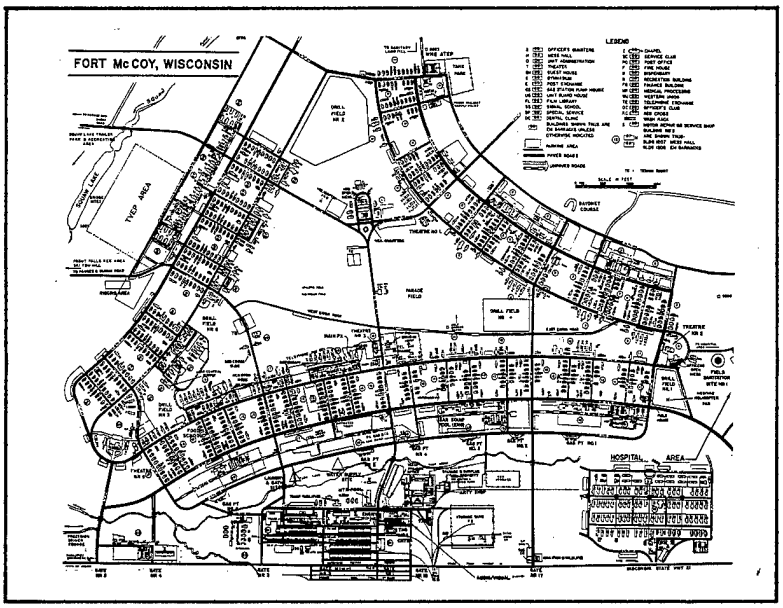
ENERGY SAVINGS OPPORTUNITY SURVEY AND STUDY FORT MC COY, WISCONSIN

FINAL REPORT

VOLUME 1 – EXECUTIVE SUMMARY



PREPARED FOR:
U.S. ARMY CORPS OF ENGINEERS
OMAHA DISTRICT

PROJECT A1-132
CONTRACT NO. DACA45-87-C-0056

January 1989

PREPARED BY:

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GARD PROJECT A1-132

FINAL REPORT
FOR
ENERGY SAVINGS OPPORTUNITY SURVEY
AND STUDY
FORT McCOY, WISCONSIN

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For
Department of the Army
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Omaha District

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FOREWORD

The GARD Division of Chamberlain Manufacturing Corporation has prepared this Final Report for the Corps of Engineers, Omaha District as part of the requirements under Contract No. DACA45-87-C-0056. This report presents the results of individual energy analyses which were performed for selected building energy conservation opportunities (ECO's) and projects which were identified by the contract Scope of Work.

GARD has appreciated the direction and assistance provided by the Omaha District, especially the Program Manager, Mr. Stan Owens, and the Ft. McCoy Directorate of Engineering and Housing (DEH) headed by LTC Marvin W. Westenburg, Director and Mr. Darrell Neitzel, Deputy Director.

The GARD project team participating in this survey and study includes Jim Carrington, Roger Hedrick, Neil Leslie and the undersigned.

Respectfully submitted,

R.H. Henninger, P.E.
Program Manager

Approved by:

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Department Manager, Systems Engineering

FINAL REPORT
EXECUTIVE SUMMARY
OF
ENERGY SAVINGS OPPORTUNITY SURVEY AND STUDY
FOR
FT. McCOY, WI

Authorization for Study

This Energy Savings Opportunity Survey (ESOS) and Study at Ft. McCoy, Wisconsin was conducted under Contract No. DACA45-87-C-0056 issued by the Omaha District, Corps of Engineers to the GARD Division of Chamberlain Manufacturing Corporation on January 7, 1987. A General Scope of Work dated July 28, 1986 described the general requirements for the survey and study; Annexes A through G, J and K specifically described the work items to be accomplished at Ft. McCoy, Wisconsin.

Objectives and Scope

As stated in the ESOS Scope of Work, the objectives of the study were:

1. Review the previously completed Energy Engineering Analysis Program (EEAP) study and any other energy studies which were performed at the installation.

2. Re-evaluate selected projects and energy conservation opportunities (ECOs) from the previous studies to determine their economic feasibility based on revised criteria, current site conditions and technical applicability.

3. Evaluate selected ECOs to determine their energy savings potential and economic feasibility.

4. Perform a limited site survey of selected buildings or areas to insure that any new methods of energy conservation which are practical and have not been evaluated in any previous energy study have been considered and the results documented.

5. Provide complete new programming or implementation documentation for all recommended ECOs.

6. Prepare a comprehensive report to document the work performed, the results and the recommendations.

Annex B, Detailed Scope of Work, required that the following specific work tasks be performed at Ft. McCoy, Wisconsin:

1. Selected ECOs for 230 buildings as presented in matrix form in Annex E be analyzed for energy saving potential.

2. Previous EEAP project entitled "Weatherization of Task Force Training Area Buildings" (Annex F) be re-evaluated in more detail.

3. Previous EEAP project entitled "Install Local Equipment to Eliminate Use of Hospital Area Boiler" (Annex G) be re-evaluated.

4. Study the Sun Prairie Family Housing complex (Annex K) by applying the applicable ECOs listed in Annex A.

5. Study the burning of waste oil and determine if this is economically feasible.

6. Study the electrical power factor and determine if measures to improve the power factor are economically feasible.

This submittal presents the results of investigations and engineering analyses performed for each of the above work tasks.

Approach

The approach utilized to conduct this Energy Saving Opportunity Survey and Study consisted of:

1. Review of government furnished materials including reports from a previously conducted Energy Engineering Analysis Program for Ft. McCoy dated October 1981.

2. Obtaining and reviewing historical energy usage data and costs for the installation for the period October 1984 through February 1987.

3. Field survey of 230 buildings and recording of data and observations on field data record forms for each building's envelope, heating equipment, air handling system, controls, domestic hot water system and lighting systems.

4. Field survey of selected homes at the Sun Prairie Family Housing complex.

5. Interview personnel from the Environmental Management and Energy Control Office, EP and S, Planning and Estimating, Heating Shop and DEH.

6. Calculation of annual heating energy usage for each building surveyed using in-house energy analysis programs.

7. Evaluation of individual ECOs on a building-by-building basis through calculation of potential energy and cost savings, estimation of implementation costs and determination of the savings investment ratio (SIR) and simple payback period.

8. Re-evaluation of previously proposed EEAP projects by review of design approach and updating of construction and energy costs.

9. Presentation of results in an Interim Report for review by Corps of Engineers, FORSCOM and Ft. McCoy personnel for the purpose of providing guidance in grouping of ECOs into projects for documentation.

10. Preparation and submission of a Final Report and programming documentation for all approved projects.

Site Description

Ft. McCoy (Figure ES.1) is a government owned and operated installation which is part of the Forces Command (FORSCOM), U.S. Army. The installation covers almost 60,000 acres and is located in southwestern Wisconsin about 30 miles east of LaCrosse. The post was designated Ft. McCoy in 1974, reflecting its status as a permanent military installation. Currently the installation is used primarily for Reserve and National Guard training. Reserve units from 106 Reserve Centers utilize the facilities for weekend activities during the winter and for summer camp training during the summer months. The left-hand leg of the triangle of buildings is used primarily for winter training while the right-hand leg is heavily used

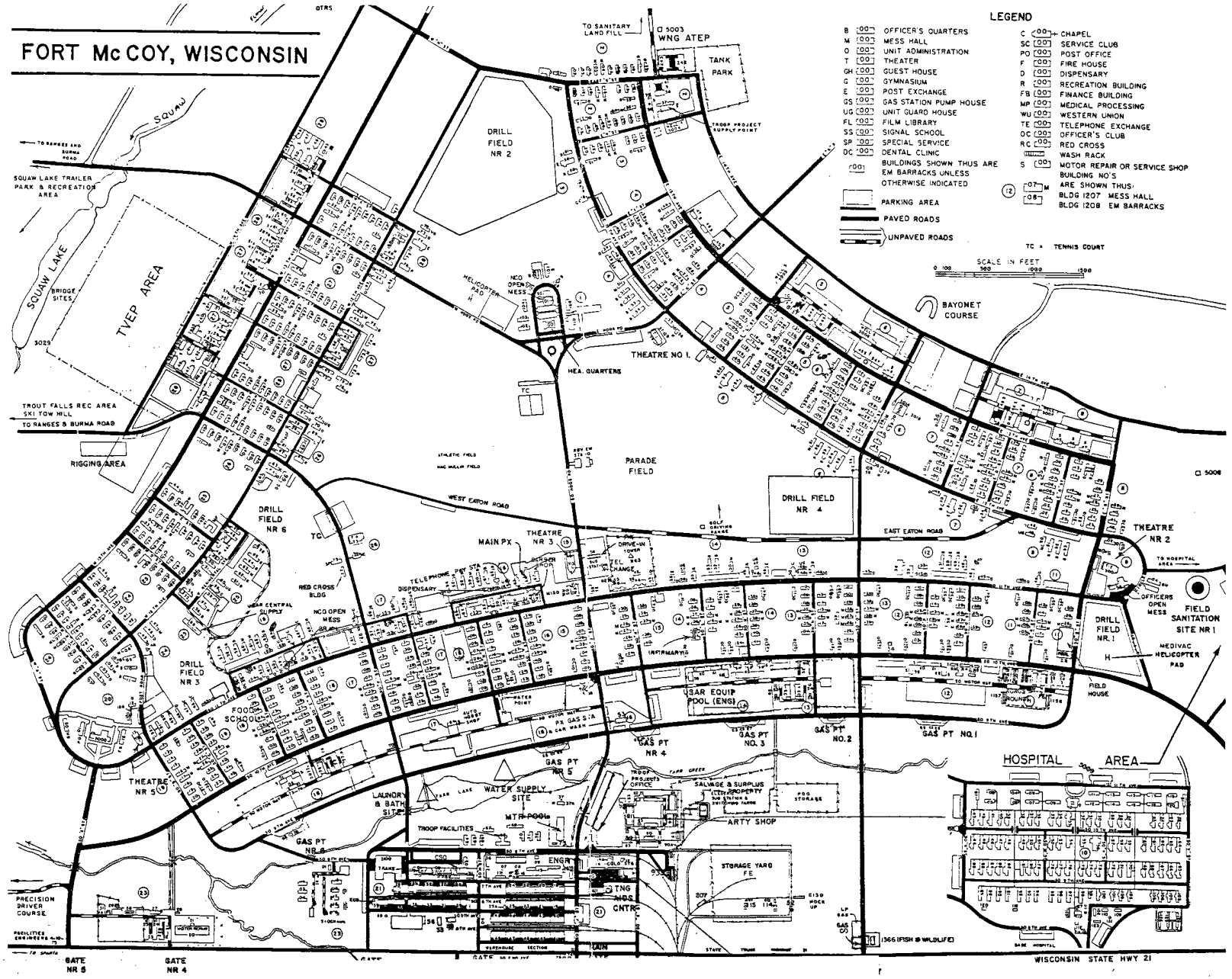


Figure ES.1 FT. McCOY BUILDING AREA MAP

in the summer. Buildings in the lower leg of the triangle are used year round for a classroom training school. The baseline population is about 800 people, mostly civilian, with 120 military personnel. On weekends during the winter an additional 1,000 reserve personnel are onsite while during the summer this number soars to 12,000 personnel.

Buildings

According to a Ft. McCoy DEH report dated 3/31/86 there are a total of 1,568 buildings located at Ft. McCoy which contain 6,177,191 square feet. The 1,568 buildings are categorized as follows:

CLASSIFICATION	NO. BUILDINGS	FLOOR AREA (Sq. Ft.)
Operational & Training	78	110,061
Maintenance	75	410,050
R&D Testing	3	2,700
Storage	163	533,870
Medical & Dental	86	385,332
Administration	29	146,427
Family Housing	20	31,131
Troop Housing	857	3,637,803
Bachelor Officer Quarters	76	439,086
Community	121	448,426
Utilities & Ground Improvements	60	32,305
TOTALS	1,568	6,177,191

When broken down by type of construction, the buildings can be further classified as follows:

TYPE OF CONSTRUCTION	FLOOR AREA (SQ. FT.)	NO. BUILDINGS
Permanent	238,533	81
Semi-permanent	13,706	23
Temporary	5,924,952	1,464
TOTALS	6,177,191	1,568

By far the largest percentage of the buildings fall into the temporary category due more to the type of construction rather than their condition. Although more than 40 years old, the frame construction buildings are in good condition and due to their longevity could be classified as permanent buildings.

The major portion of this ESOS study centered around some 230 buildings which are currently being utilized year-round or are targeted for year-round use. A breakdown of these buildings by category follows:

CLASSIFICATION	NO. OF BUILDINGS	TOTAL SQ. FT.
Training & Classrooms	17	66,870
Maintenance	16	178,375
Warehouse & Storage	32	239,223
Quarters	49	310,482
Administration	75	354,809
Recreation	5	50,091
Barracks	9	47,790
Medical & Dental	2	11,160
Operations	25	64,285
TOTALS	230	1,323,085

Historical Energy Consumption

Table ES.1 summarizes current energy consumption (FY86) levels and purchased energy costs. Figures ES.2, ES.3 and ES.4 depict monthly energy consumption in MBTU, dollars and percentage for the period from 10/84 to 2/87. It is interesting to note what a small percentage of the total energy consumption is represented by electricity. At Ft. McCoy itself, electricity is only 10.2% of the total MBTU usage. On a cost basis, electricity is 23.3% of the total cost for utilities. Since very little in the way of air conditioning or process energy is used at Ft. McCoy, the remaining energy, i.e., fuels, is being used primarily for heating.

Current Energy Costs

As per information provided by the Ft. McCoy Environmental Management and Energy Control Office on April 9, 1987, prices paid for energy were as follows:

ENERGY TYPE	PURCHASED COST $/Unit	LABOR HANDLING COST $/Unit	- - TOTAL COST - - $/Unit	$/MBTU
Electricity	0.05/KWH (1)		0.05/KWH	14.591
#2 Fuel Oil	0.75/gal		0.75/gal	5.410
Natural Gas	4.58/KCF		4.58/KCF	4.448
Propane	0.588/gal		0.588/gal	6.189
Lump Coal	71.94/ton	227.28/ton	299.22/ton	12.173
Stoker Coal	67.62/ton	146.19/ton	213.81/ton	8.698
Wood Pellets	66.11/ton	46.10/ton	112.21/ton	6.601

(1) Includes demand charges

TABLE ES.1

FT. McCOY, WISCONSIN
FY 86 ENERGY CONSUMPTION AND COST DATA

ON-SITE ENERGY BREAKDOWN

FUEL	CONSUMPTION (MBTU)	% OF TOTAL	COST ($)	% OF TOTAL
Electricity	36,175	10.2	402,871	23.3
#2 Fuel Oil	20,336	5.7	121,673	7.0
Waste Oil	3,150	0.9	630	.0
Coal	144,827	40.7	395,517	22.8
Propane	95,718	26.0	604,797	34.9
Wood	55,760	15.7	206,189	11.9
TOTAL	355,966	100.0	1,731,677	100.0

SUN PRAIRIE FAMILY HOUSING ENERGY BREAKDOWN

FUEL	CONSUMPTION (MBTU)	% OF TOTAL	COST ($)	% OF TOTAL
Electricity	2,484	12.7	30,960	26.5
Natural Gas	17,102	87.3	85,756	73.5
TOTAL	19,586	100.0	116,716	100.0

FORT McCOY

ON-SITE ENERGY CONSUMPTION

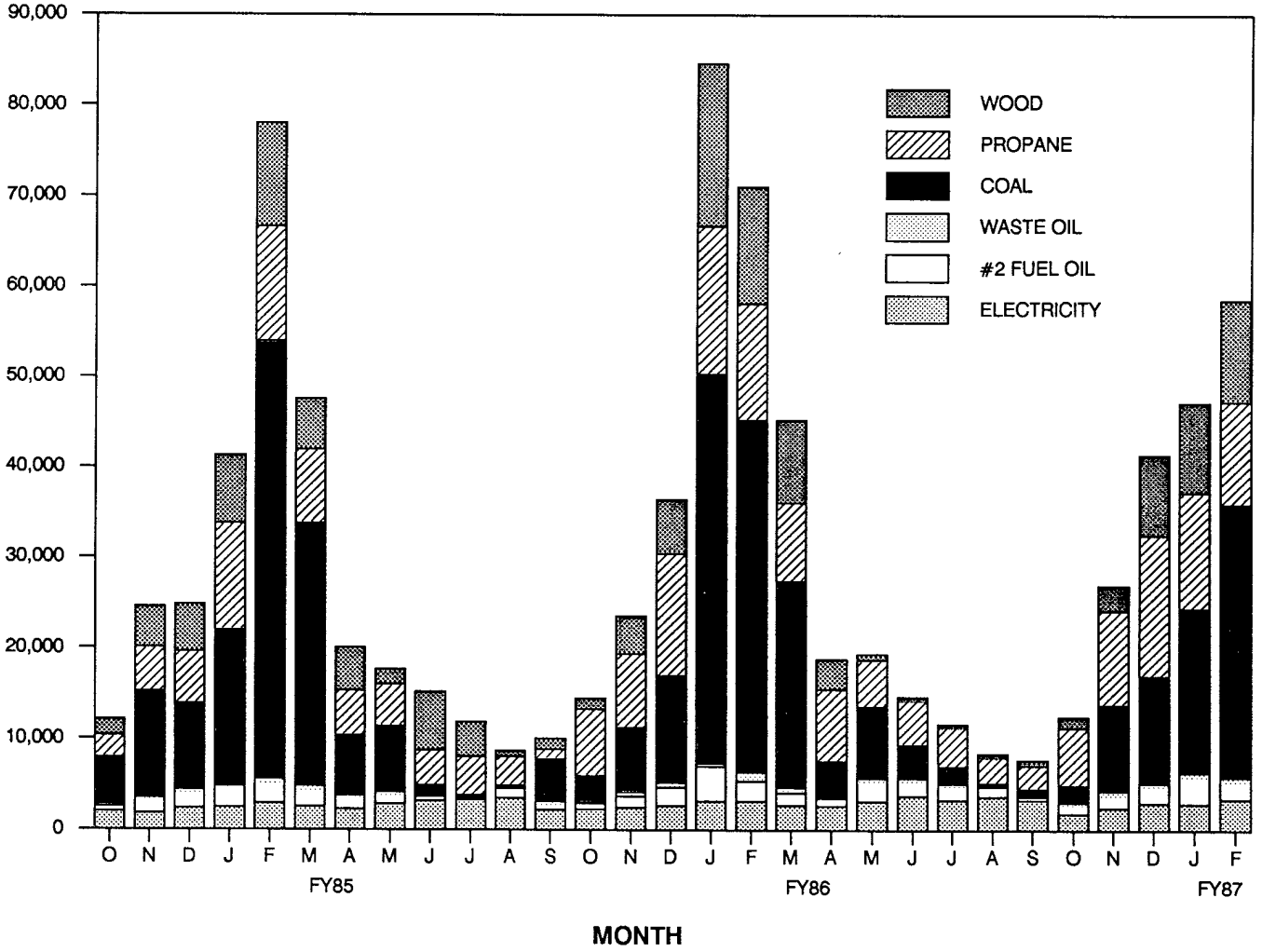


FIGURE ES.2 FT. McCOY ON-SITE TOTAL ENERGY CONSUMPTION DATA, 10/84 TO 2/87

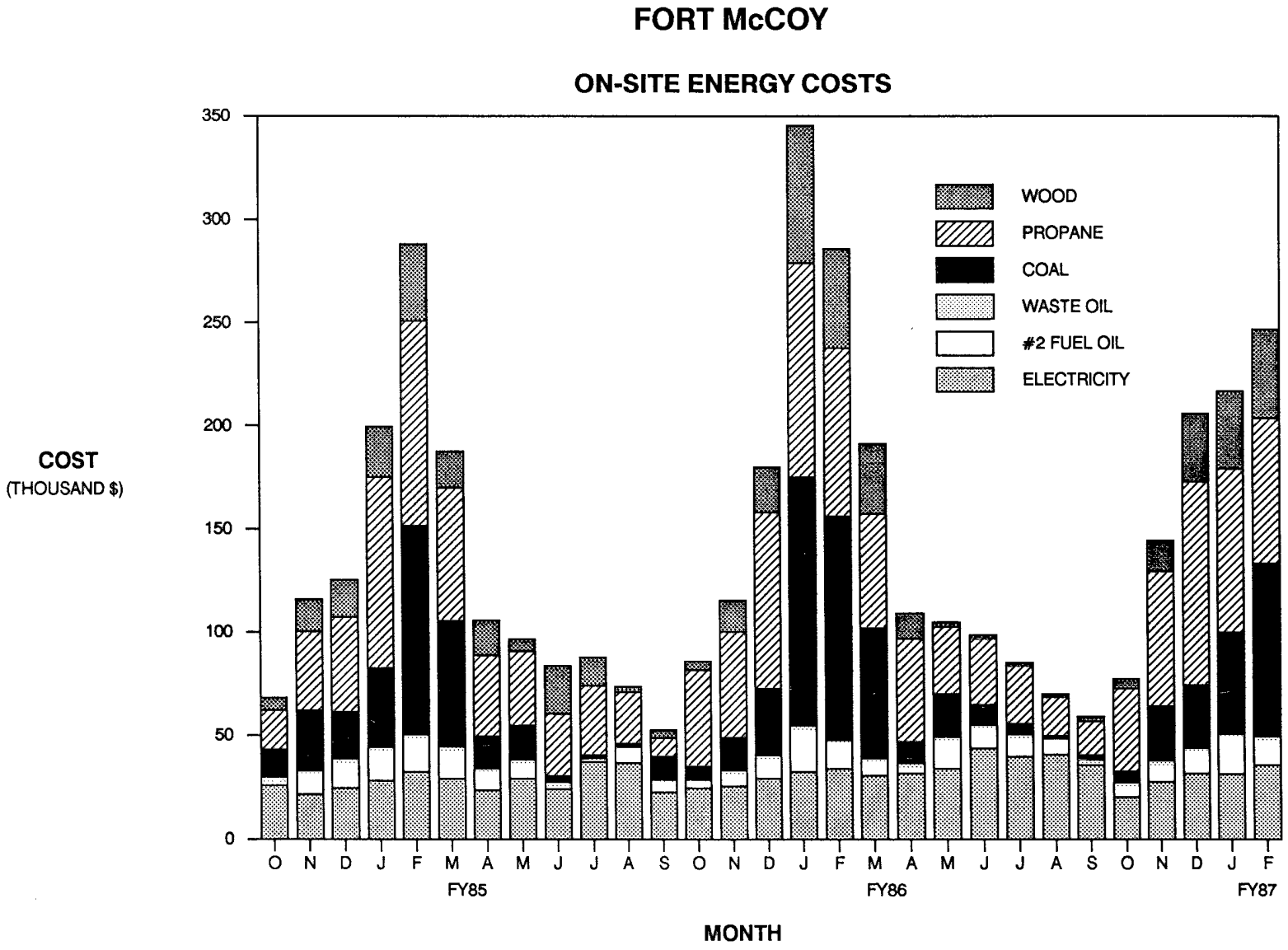
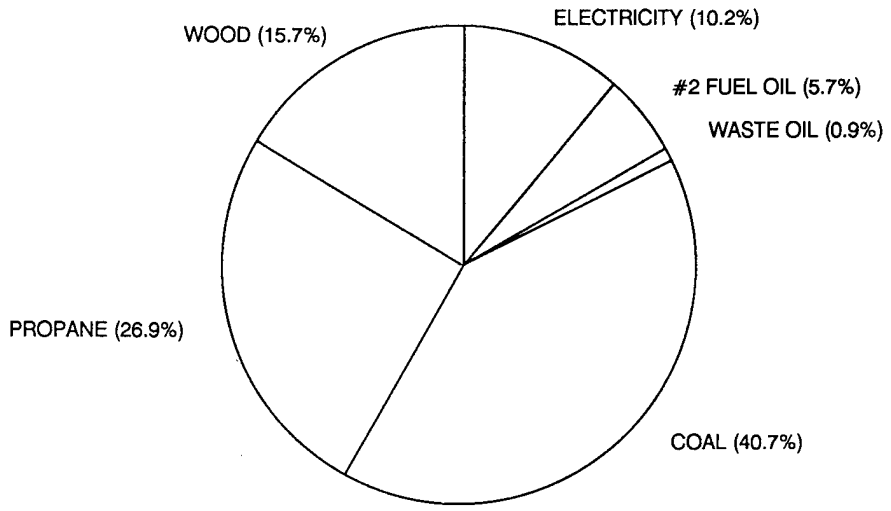


FIGURE ES.3 FT. McCOY ON-SITE TOTAL ENERGY COST DATA, 10/84 TO 2/87

FORT McCOY

FY 86 ON-SITE ENERGY CONSUMPTION



FY 86 ON-SITE ENERGY COSTS

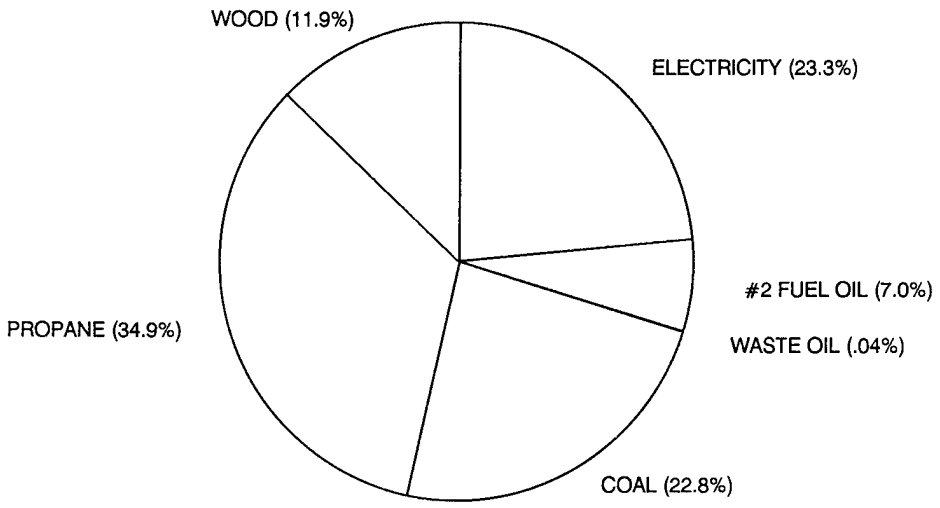


FIGURE ES.4 FT. McCOY ON-SITE TOTAL ENERGY CONSUMPTION DATA FOR FY86 - PERCENT

Types of Heating and Domestic Hot Water Systems

More than 90% of the energy consumed onsite at Ft. McCoy is for providing space heating and domestic hot water. A variety of energy sources and heating systems are currently used as summarized in Tables ES.2 through ES.4. Ft. McCoy's mobilization plan calls for Blocks 11-19 (south leg of triangle) to use primarily gas for heating while the other two legs of the triangle, Blocks 2-8 and 24-28, would use primarily wood and coal. As a consequence, each energy type can be found being used on forced air, steam and hot water systems. Typically, each building has a self-contained heating system with many buildings containing heating systems which are old and inefficient. Domestic hot water systems were generally found to be in good condition but often needing insulation on bare hot pipes.

Energy Consumption For Surveyed Buildings

Estimates of heating energy and electricity used by the 230 buildings under study was calculated on a building-by-building basis. It is estimated that these 230 buildings consume 217,297 MBTU of heating fuels and 11,670 MBTU of electricity for a total of 228,967 MBTU. Compared to the basewide FY86 energy consumption of 355,966 MBTU reported in Table ES.1, these buildings represent about 64.3% of the basewide usage. Normalizing energy use for these buildings on a per square foot of floor area basis results in an energy usage rate of 173,055 BTU/SQ. FT./YR. This figure would indicate that there is good potential for saving energy in these buildings.

Energy Conservation Opportunity Analysis

Life cycle cost analyses were conducted for all 230 buildings identified in Annex E of the Scope of Work. During the months of February and April 1987 each building was surveyed and the results documented on Field Data Record Forms.

DISTRIBUTION OF SPACE HEATING AND DOMESTIC HOT WATER SYSTEMS BY ENERGY SOURCE

ENERGY SOURCE	— SPACE HEATING — QUANTITY	%	— DOMESTIC HOT WATER — QUANTITY	%
Coal	29	12.6	3	1.3
Wood	19	8.3	-	-
Coal/Wood	48	20.9	-	-
Propane	103	44.8	75	32.6
Oil	11	4.8	2	0.1
Electric	13	5.6	73	31.7
None	7	3.0	77	33.3
TOTAL	230	100.0	230	100.0

TABLE ES.3
DISTRIBUTION OF SPACE HEATING SYSTEMS BY TYPE OF DISTRIBUTION SYSTEM

TYPE OF DISTRIBUTION SYSTEM	QUANTITY	%
Forced Air	136	59.1
Steam	63	31.5
Hot Water	24	10.4
None	7	3.0
TOTAL	230	100.0

TABLE ES.4
DISTRIBUTION OF SPACE HEATING SYSTEMS BY TYPE AND ENERGY SOURCE

TYPE OF DISTRIBUTION SYSTEM	TYPE OF ENERGY SOURCE — PROPANE	COAL	WOOD	COAL/WOOD	OIL	ELECTRIC	TOTAL
Forced Air	85	15	15	9	-	12	136
Steam	7	13	3	37	3	-	63
Hot Water	11	1	1	2	8	1	24
TOTAL	103	29	19	48	11	13	223

Fourteen ECOs were specifically targeted by the contract Scope of Work for investigation and were selectively specified on an individual building basis. These ECOs and others were investigated and applied to the subject buildings. The list below summarizes all ECOs by catagory:

1. Weatherization ECOs
   a) Insulate walls
   b) Insulate floors
   c) Insulate ceilings
   d) Replace window systems
   e) Weatherstrip and caulk windows
   f) Reduce window area
   g) Install insulated translucent panels
   h) Install plastic strip doors (Warehouses & Maintenance)

2. Lighting ECOs
   a) Replace incandescent lamps with fluorescent fixtures
   b) Replace lights in high bay areas with high pressure sodium lamps
   c) Replace 40 watt fluorescent tubes with 35 watt tubes
   d) Delamp
   e) Additional light switches and occupancy sensors

3. Heating system ECOs
   a) Install automated day/night setback thermostats
   b) Install radiator control valves
   c) Insulate hot pipes
   d) Insulate hot air ducts
   e) Replace inefficient furnaces
   f) Install disable controls on steam boilers
   g) Zoning of forced air systems in 2-story buildings
   h) Revise and repair HVAC controls
   i) Shutdown/modify water heaters (Barracks & BOQs)
   j) Install ceiling fans in high bay areas.

All weatherization and most lighting ECOs were applied and evaluated for all buildings and savings investment ratios (SIR) and simple payback periods were calculated for each individual building. Certain heating system ECOs were applied selectively on the basis of the type of building and type of heating system within the building. For those buildings where

application of a given ECO resulted in a SIR greater than 1.0, the ECO was recommended for implementation. Table ES.5 presents the results of the ECO analysis with ECOs rank ordered by decreasing SIR. The results in Table ES.5 do not account for synergistic effects which reduce the total energy savings when several different ECOs are implemented as a package on individual buildings.

Special Projects Results

The following summarizes the results for special projects which were re-evaluated or investigated:

1. Project 1 - Utilization of Waste Oil as a Boiler Fuel

   The State of Wisconsin, Department of Natural Resources has authorized the burning of waste oil at Ft. McCoy as a supplemental fuel in Building 3050. The amount of waste oil burned cannot exceed 10,000 gallons annually and must be mixed in proper proportions with No. 2 fuel oil. A concept design for a system was prepared to store, process, filter and blend the oils. An operating scenario was also developed. Construction and operating costs were determined and compared to the alternative of disposing of the waste oil, some of which is classified as a hazardous waste. At a disposal cost of $0.76 per gallon, it becomes economically feasible (SIR = 1.0) to burn waste oil at Ft. McCoy. The proposed system would cost about $107,000 to install and $23,000 to operate including the required No. 2 makeup oil. This project is not recommended for implementation since Ft. McCoy is currently able to sell their waste oil for $0.02 per gallon.

2. Project 2 - Sun Prairie Family Housing

   The Sun Prairie Family Housing complex is located in Sun Prairie, Wisconsin, a northeast suburb of Madison. At this location are 76 housing buildings including 34 duplexes and 42 single dwelling units. During the last 5-6 years, many energy conservation improvements have been made to these buildings including insulation of attics, installation of insulated aluminum siding (15 buildings), installation of insulated window systems, insulation of aboveground portion of basement walls, installation of new gas fired forced air heating systems with vent dampers, installation of new gas fired hot water heaters with vent dampers and installation of

storm doors. From an energy conservation standpoint these buildings are in excellent condition. Three additional ECOs as listed below are recommended for implementation and result in a SIR of 7.4 and a simple payback period of 2.5 years:

a) Installation of shower head flow restrictors
b) Installation of automatic night setback thermostats
c) Insulation of hot water piping.

3. Project 3 - Weatherization of Task Force Training Area Buildings

This project was proposed as part of a previous EEAP study conducted back in 1981. Ten weatherization ECOs had been applied to 70 buildings located in Blocks 25-27. As per guidance given by the DEH the project was re-evaluated and updated for current energy and construction costs. The following eight ECOs had a SIR greater than 1.0 and are recommended for implementation:

Install day/night setback thermostats
Weatherstrip doors
Insulate roofs
Insulate truck doors
Insulate boiler piping
Insulate floors
Insulate walls
Replace window systems.

The project as a whole had a SIR = 6.7 and a simple payback period of 1.8 years.

4. Project 4 - Installation of Local Equipment to Eliminate Use of Hospital Area Boiler

The hospital area (Block 10) contains 100 buildings which are heated by a central heating plant. Currently only 21 buildings are used 3-4 months per year during the summer period. The central heating plant must be operated to supply the domestic hot water and steam sterilization needs of these 21 buildings. A previous EEAP study had proposed that individual domestic hot water heaters and a small steam generator be installed to handle these heating demands. This project was re-evaluated and is still considered feasible. Updating of the energy savings and construction costs still gives this project an SIR of 8.3 and a simple payback period of 1.6 years.

5. Project 5 - Electrical Power Factor Improvement

Power factor correction equipment already has been installed at the point of incoming electrical service.

This equipment works well and is maintaining the power factor at 90% and above. There appears to be no need therefore, for additional equipment to be installed at this location on the electrical distribution system. It may be beneficial however, to install power factor correction equipment locally at certain buildings where large intermittant loads occur. Buildings 5014, 3050 and 242 have been suggested as candidates. As per recommendations at the Interim Review Meeting, this project was dropped from further consideration.

Recommended Retrofit Projects

As per guidance received from Ft. McCoy on July 14, 1988, the ECOs and special projects were grouped into 22 packages to facilitate documentation and implementation. Table ES.6 presents a summary of each package. Energy savings indicated for each package includes synergistic effects between ECOs. If all retrofit changes as recommended in these 22 packages are implemented, the resulting total onsite energy savings at Ft. McCoy is estimated to be 125,121 MBTU annually or 35.1% of the basewide FY86 consumption (reference Table ES.1); the total offsite energy savings at Sun Prarie Family Housing is estimated to be 3,069 MBTU annually or 15.7% of the FY86 consumption for Sun Prarie. Non-attractive ECOs are listed in Table ES.7.

In accordance with decisions made at the Interim Review meeting held at Ft. McCoy on March 16, 1988 and attended by representives from Ft. McCoy, FORSCOM, Huntsville COE and Omaha COE, "Documentation For Productivity Capital Investment Program" (DA Form 5108-R) along with supporting documentation and calculations were prepared for each package. These implementation documents are bound together in Volume 4 of this final report submittal.

TABLE ES.5

SUMMARY OF ENERGY SAVINGS BY ENERGY CONSERVATION OPPORTUNITY

ECO	No. Buildings	Annual Energy Savings (MBTU)	Annual Energy Savings ($)	Discounted Savings ($)	Installed Cost ($)	Savings Investment Ratio	Simple Payback Period
INSTALL AUTOMATED DAY/NIGHT SETBACK THERMOSTATS	136	8573.83	60208.17	658222.11	11327.44	58.11	0.19
INSULATE HOT AIR DUCTS	36	3167.88	22146.42	238831.40	9610.81	24.85	0.43
INSULATE CEILINGS (BATT FIBERGLASS, 12.0 IN., R 38)	25	13454.50	141044.13	1715215.05	69704.42	24.61	0.49
INSULATE BOILER PIPING	13	523.35	4512.34	59619.77	2715.64	21.95	0.60
INSTALL BOILER LOCKOUT & NIGHT SETBACK CONTROLS	24	3091.57	24250.76	236648.93	10837.92	21.84	0.45
INSULATE CEILINGS (BATT FIBERGLASS, 9.0 IN., R 30)	26	9996.65	67023.72	1020349.59	47624.16	21.43	0.71
REDUCE WINDOW AREA	6	3364.61	27544.51	360481.17	24495.85	14.72	0.89
INSULATE DOMESTIC HOT WATER PIPING	65	856.50	7030.86	75726.76	6188.48	12.24	0.88
REPLACE FURNACES & IMPLEMENT ZONING	8	2736.32	18666.53	215229.45	19134.73	11.25	1.03
INSULATE FLOORS (BATT FIBERGLASS, 8.5 IN., R 30)	31	13689.40	114658.23	1457737.49	135307.94	10.77	1.18
INSULATE WALLS (BLOWN IN 3.5 IN.)	78	18983.83	153275.88	2110744.63	230666.01	9.15	1.50
REPLACE INEFFICIENT FURNACES	9	2696.84	23463.51	239055.99	30049.82	7.96	1.28
INSTALL BOILER LOCKOUT CONTROLS	27	580.39	4789.26	46589.43	8028.03	5.80	1.68
REPLACE WINDOW SYSTEMS (SP,DH,UW - DP,DH,W)	77	21777.46	192661.28	2580230.14	728369.94	3.54	3.78
INSTALL HPS LAMPS	2	53.50	3422.39	25057.00	7544.39	3.32	2.20
INSTALL RADIATOR CONTROL VALVES	10	1650.29	13001.29	133102.88	41073.34	3.24	3.16
IMPLEMENT ZONING OF FORCED AIR SYSTEMS IN 2-STORY BUILDINGS	25	1411.14	9538.43	100527.51	31259.00	3.22	3.28
DELAMP	10	-34.96	2201.84	19526.36	10117.25	1.93	4.59
REPLACE INCANDESCENT LAMPS W/35W FLUORESCENTS	71	-236.87	10458.12	82374.78	48378.34	1.70	4.63
TOTALS		106336.22	899897.66	11375270.43	1472433.53	7.73	1.64

TABLE ES.6

FT. Mc COY ENERGY SAVINGS SUMMARY BY PACKAGE (INCLUDES SYNERGISTIC EFFECTS)

Package	Buildings Included	No. Buildings	Annual Energy Savings (MBTU)	Annual Energy Savings ($)	Discounted Savings ($)	Installed Cost ($)	Savings Investment Ratio	Simple Payback Period
Retrofit Buildings (Annex E)								
1	Bldgs. 100 - 1122	23	6,264	63,557	738,398	147,914	5.0	2.3
2	Bldgs. 1130 - 1324	35	8,561	64,813	833,193	147,713	5.6	2.3
3	Bldgs. 1325 - 1428	32	7,694	50,032	756,732	147,509	5.1	3.0
4	Bldgs. 1432 - 1463	11	5,449	42,770	610,404	141,252	4.3	3.3
5	Bldgs. 1501 - 1713	16	7,733	73,077	920,237	147,468	6.2	2.0
6	Bldgs. 1728 - 2011	17	7,803	72,631	900,276	155,420	5.8	2.1
7	Bldgs. 2012 - 2138	28	10,337	80,663	1,017,500	137,514	7.4	1.7
8	Bldgs. 2139 - 2180	14	5,546	46,807	593,073	118,169	5.0	2.5
9	Bldgs. 2181 - 2569	11	10,230	73,746	941,453	151,233	6.2	2.1
10	Bldgs. 2572 - 9020	26	7,003	65,245	837,092	152,993	5.5	2.3
11	Bldgs. 9035 - 21174	5	1,312	15,992	193,824	25,248	7.7	1.6
		218	77,932	649,333	8,342,182	1,472,433	5.7	2.3
Task Force Training Area (Annex F)								
12	Bldgs. 2423 - 2432	9	4,419	43,881	533,536	160,508	3.3	3.7
13	Bldgs. 2433 - 2442	8	3,990	39,667	482,067	147,102	3.3	3.7
14	Bldgs. 2444 - 2504	8	4,246	41,962	509,565	133,693	3.8	3.2
15	Bldgs. 2505 - 2514	8	4,834	47,849	580,017	147,103	3.9	3.1
16	Bldgs. 2517 - 2525	8	4,884	48,429	587,181	151,065	3.9	3.1
17	Bldgs. 2526 - 2536	9	5,395	53,321	646,220	162,017	4.0	3.0
18	Bldgs. 2506, 2539 - 2555	7	5,387	53,013	642,908	156,749	4.1	3.0
19	Bldgs. 2515, 2537, 2562 - 2569	6	4,332	42,903	521,727	137,245	3.8	3.2
20	Bldgs. 2647 - 2759	7	6,341	61,375	741,351	99,183	7.5	1.6
		70	43,828	432,400	5,244,572	1,294,665	4.1	3.0
21	Sun Prarie Family Housing (Annex K)	76	3,069	13,846	254,009	34,385	7.4	2.5
22	Hospital Area (Annex G)	21	3,361	69,781	907,226	109,984	8.3	1.6

TABLE ES.7

NON-ATTRACTIVE ECOs AT FT. McCOY

BUILDING CATEGORY	NON-ATTRACTIVE ECO	BUILDINGS OR HEATING SYSTEM TYPES ECO NOT APPLICABLE TO: BUILDINGS	HEATING FUEL	HEATING SYSTEM DISTRIBUTION MEANS	HOURS BLDG. LIT
RETROFIT BUILDINGS (ANNEX E)	REPLACE 40W FLUORESCENTS W/ 35W FLUORESCENTS	ALL BLDGS			
	REPLACE INCANDESCENT LAMPS W/ 35W FLUORESCENTS	*	Coal (Lump)	Forced Air	9 OR 12
			Coal (Lump)	Hot Water/Steam	9 OR 12
			Coal (Stoker)	Forced Air	12
			Coal/Wood	Forced Air	9 OR 12
			Electric	Hot Water/Steam	9 OR 12
			Propane	Old, Round, Forced Air	9 OR 12
	INSULATE CEILINGS, INCREMENTAL (BATT FIBERGLASS, 9.0 IN. - 12.0 IN.)	*	Coal (Stoker)	Hot Water/Steam	NA
			Fuel Oil	Hot Water/Steam	NA
			Propane	Forced Air	NA
			Propane	Hot Water/Steam	NA
			Wood	Forced Air	NA
			Wood	Hot Water/Steam	NA
	INSTALL HPS LIGHTS	ALL BLDGS EXCEPT 1122, 1713, & 2569			
TASK FORCE TRAINING AREA (ANNEX F)	INSTALL VESTIBULES	ALL BLDGS			
SUN PRAIRIE FAMILY HOUSING (ANNEX K)	INSULATE DHW TANKS	ALL BLDGS			
	REPLACE INCANDESCENT LAMPS IN KITCHEN W/ 35W FLUORESCENTS	ALL BLDGS			

* If specific buildings are not called out in the "BUILDINGS" column of the table, the ECO is only unattractive in those buildings having the heating system types specified in the last 3 columns.