FINAL REPORT

ENERGY ENGINEERING ANALYSIS PROGRAM U.S. ARMY KWAJALEIN ATOLL

CONTRACT: DACA83-90-C0024

VOLUME I
EXECUTIVE SUMMARY
APPENDICES B & C

PREPARED FOR:
DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT
PACIFIC OCEAN DIVISION
HONOLULU

PREPARED BY:

DECEMBER 1990

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1. EXECUTIVE SUMMARY

1. Introduction

This contract (DACA83-90-C-0024) was issued to Engineering Sciences, Inc. to perform an Energy Savings Opportunities Survey (ESOS) as Energy Engineering Analysis Program (EEAP) for the U.S. Army Kwajalein Atoll (USAKA) at Kwajalein and Roi Namur. The purpose of the study was to identify and develop Energy Conservation Opportunities (ECOs) and prepare appropriate Project Documentation as directed by the client.

2. Building Data

The study included 81 of the largest buildings at Kwajalein and Roi Namur (total area estimated in the Scope of Work as 1,241,758 SF). In addition it included 126 Family Quarters (363,682 SF) and 254 Trailers (167,640 SF). The total building area is, then, 1,773,080 SF. The Family Quarters and Trailers were to be studied in "typical" form using 21 different floor plan Family Quarters and one Trailer.

3. Present Energy Consumption

It was agreed in the course of negotiations that the Contractor would not be responsible for determining the absolute energy consumption of the buildings, only the change resulting from implementation of ECOs. The Contractor was, however, provided data for the total electric power production of the two plants at Kwajalein and the one plant at Roi Namur. Data was also available for the fuel oil deliveries to buildings 502, 703, and 710.

In total, the average annual usage based upon the data supplied was:

Electricity	100,798,000 [KWH]	or	344,024 [MBTU]
Fuel Oil	120,450 [GAL]	or	16,706 [MBTU]
Total			360,730 [MBTU]

4. Historical Energy Consumption

Electric production (in KWH/MO) from the three plants has been, over a seventeen month period ending in SEP 1989:

MON/YR	KWAJ #1	KWAJ #2	KWAJ	ROI NAMUR	TOTAL
May-88	5,029,817	400,500	5,430,317	3,022,200	8,452,517
Jun-88	4,769,644	343,990	5,113,634	2,887,300	8,000,934
Jul-88	4,918,032	225,450	5,143,482	2,947,100	8,090,582
Aug-88	5,125,742	322,390	5,448,132	2,798,500	8,246,632
Sep-88	4,694,355	597,414	5,291,769	2,872,800	8,164,569
Oct-88	5,233,426	293,590	5,527,016	3,009,100	8,536,116
Nov-88	5,174,410	276,000	5,450,410	2,685,600	8,136,010
Dec-88	5,084,220	558,020	5,642,240	2,764,100	8,406,340
Jan-89	5,205,140	573,220	5,778,360	2,880,900	8,659,260
Feb-89	4,804,840	408,890	5,213,730	2,523,700	7,737,430
Mar-89	5,188,130	760,950	5,949,080	2,654,700	8,603,780

Apr-89	5,094,730	428,270	5,523,000	2,670,100	8,193,100
May-89	5,387,190	350,250	5,737,440	2,930,000	8,667,440
Jun-89	5,219,830	247,580	5,467,410	2,779,800	8,247,210
Jul-89	5,401,820	226,770	5,628,590	2,795,000	8,423,590
Aug-89	5,451,450	326,810	5,778,260	2,885,000	8,663,260
Sep-89	5,441,710	250,320	5,692,030	2,832,900	8,524,930

Fuel Oil deliveries (in Gallons) to the various buildings which use fuel oil directly during this same period were:

MON/YR	LAUNDRY 710	PDR 703	YOKWE YUK 502	TOTAL
May-88	5,901	1,926	810	8,637
Jun-88	6,758	2,510	1,023	10,291
Jul-88	5,166	2,318	723	8,207
Aug-88	4,980	2,273	809	8,062
Sep-88	5,172	2,911	816	8,899
Oct-88	1,352	770	785	2,907
Nov-88	11,780	500	744	13,024
Dec-88	9,851	3,913	1,022	14,786
Jan-89	6,488	2,920	566	9,974
Feb-89	6,659	2,853	689	10,201
Mar-89	8,190	3,491	839	12,520
Apr-89	6,080	2,302	766	9,148
May-89	5,794	2,497	688	8,979
Jun-89	7,053	3,328	792	11,173
Jul-89	5,708	3,911	854	10,473
Aug-89	7,215	3,863	1,081	12,159
Sep-89	6,523	3,890	785	11,198

5. Reevaluated Projects Results

The contractor was instructed that, due to funding uncertainties, it would not be necessary to distinguish between ECOs previously identified and those that would be identified in the course of this project. The various energy conservation guides that were provided were, therefore, taken as background information and the Contractor considered all of the potential ECOs specified in the Scope of Work, as well as any that he felt might have a chance in each building.

6. Energy Conservation

An ECO checklist was used by the engineer inspecting each building. This list had been marked in advance of the Field Survey with all of the ECOs shown as possibles for the building in the Scope of Work. In addition, he attempted to identify any that were not marked which he felt might be attractive. All potential ECOs were either eliminated (with justification noted) or analyzed. Of those analyzed, those with Savings to Investment Ratios greater than

1.0 were deemed to "qualify." A total of 438 ECOs met this criteria. Summarizing these qualifying ECOs:

# OCC	ECO GROUP	ANNUAL ELEC SAVED KWH/Y	ANNUAL FUEL SAVED GAL/Y	ANNUAL ENERGY SAVED MBTU/Y	ANNUAL DOLLAR SAVED $/Y	PROJECT COST $	SPB YRS	% SAVE	% COST
114	C	8,091,009	0	27,612	$893,183	$1,597,089	1.8	38.1	22.5
110	B	6,852,086	0	23,385	$773,477	$3,276,360	4.2	33.0	46.2
163	L	3744153	0	12,779	$402,020	$1,118,642	2.8	17.0	15.7
39	A	1,579,144	0	5,390	$175,053	$321,068	1.8	7.5	4.5
6	D	1,479,743	6,770	5,989	$172,647	$1,506,001	8.7	3.7	10.6
1	R.3	82,393	0	281	$9,384	$20,976	2.2	0.4	0.3
3	P.1	19,222	4,181	646	$4,606	$6,905	1.5	0.2	0.1
1	H.8	14,040	980	184	$2,236	$0	0.0	0.1	0.0
1	S.1	0	2,358	327	$1,532	$0	0.0	0.1	0.0
438	ALL	21,106,924	14,289	74,020	2,344,139	7,086,696	3.0	100.0	100.0

This chart shows the economics of each ECO Category where:

A	Air System ECOs
B	Building Envelope ECOs
C	Control System ECOs
D	Domestic Hot Water ECOs
L	Lighting ECOs
P	Pumping ECOs
R	Refrigeration ECOs
S	Process Energy ECOs

For each Category the table shows the number of occurrences of the ECOs in the Category, the total savings in energy and dollars, the implementation cost, the Simple Pay Back, the % of total project savings attributable to that Category, and the % of total project implementation cost attributable to it.

In the course of the study the Contractor recognized that humidity control represented a major problem at USAKA, as it generally does for activities located in tropical climates. For this reason most of the buildings are operated continuously although they are unoccupied many hours each week. Before an unoccupied shutdown can be implemented (unquestionably an extremely attractive ECO) steps must be taken to bring humidity under better control. Fortunately, the steps needed are also attractive ECOs in their own right. (Principal among these are ECOs which tighten building envelopes to minimize infiltration, turn off unnecessary exhaust, improve the dehumidifying capability of the air conditioning equipment, and (with lower room humidity) raise room dry bulb temperatures. With this done, unoccupied shutdowns can be implemented in 62 of the 82 larger buildings. These prerequisite ECOs and the unoccupied shutdowns that they make possible can be thought of as a humidity control PACKAGE. This PACKAGE is recommended by the Contractor as the highest priority items for implementation because it, not only represents the most economically attractive ECOs overall, but it also addresses the critical problem of humidity control. Implementation will not only save energy but it will also make the buildings more

comfortable and increase the satisfaction and productivity of the occupants (benefits not quantified in the economic analysis).

With this PACKAGE (containing 227 of the 445 ECOs) identified, the table below summarizes the qualifying ECOs in a, perhaps, more logical manner:

# OCC	ECO GROUP	ANNUAL ELEC SAVED KWH/Y	ANNUAL FUEL SAVED GAL/Y	ANNUAL ENERGY SAVED MBTU/Y	ANNUAL DOLLAR SAVED $/Y	PROJECT COST $	SPB YRS	% SAVE	% COST
227	HUMID	12,098,399	0	41,287	$1,340,052	$3,127,072	2.3	57.2	44.1
7	C.6	60,017	0	205	$6,800	$7,463	1.1	0.3	0.1
163	L	3,744,153	0	12,777	397,953	1,109,635	2.8	17.0	15.7
9	A	447,207	0	1,526	$49,952	$81,225	1.6	2.1	1.1
18	B*	2,696,702	0	9,204	$306,129	$1,543,787	5.0	13.1	21.8
2	B.1#	1,219,914	0	4,164	$138,780	$434,970	3.1	5.9	6.1
6	D	724,877	6,770	3,413	86,715	754,663	8.7	3.7	10.6
6	OTHER	115,655	7,519	1,438	$17,758	$27,881	1.6	0.8	0.4
438	TOTAL	21,106,924	14,289	74,020	2,344,139	7,086,696	3.0	100.0	100.0

Having implemented the humidity control package, the Contractor recommended that the remaining ECOs be (in the absence of intangible benefits) implemented in order of economic attractiveness. The report further breaks down the remaining ECOs into sub-categories and, finally, into individual building ECOs ranking each by its attractiveness.

INCREASED FUEL COSTS

After the Interim Report was submitted, the cost of fuel oil (and, hence, electricity) rose substantially. Whereas a value of $0.65/GAL had been used in the study (with resulting electric rates of $0.1139/KWH and $0.0983/KWH at Kwajalein and Roi-Namur respectively), the new fuel oil cost was $1.03/GAL. An analysis was prepared and submitted to USAKA showing that the resulting electric costs would rise to $0.1425/KHW and $0.1309/KWH (Kwajalein and Roi-Namur respectively). A desire was expressed to (1) see the impact of these new rates on the overall group of ECOs developed in the study and (2) have the resulting project documentation prepared use these rates. This was agreed to by ESI.

Restating the summary of all projects in terms of the "new" electric and fuel oil costs:

ELEC SAVED KWH/Y	FUEL SAVED GAL/Y	TOTAL SAVED MBTU/Y	TOTAL SAVED $/Y	PROJ COST $	SPB YRS
21,106,924	**14,289**	**74,020**	**2,984,027**	**7,086,696**	**2.4**

7. Energy and Cost Savings

If it were possible to implement all of the qualifying ECOs the energy use at Kwajalein and Roi Namur would be reduced as follows:

	ELEC	ELEC	ELEC	OIL	OIL	OIL	TOTAL	TOTAL
	[KWH]	[MBTU]	[$]	[GAL]	[MBTU]	[$]	[MBTU]	[$]
NOW	100,798,000	344,024	13,976,290	120,450	16,706	124,064	360,730	14,100,354
ECOS	21,106,924	72,038	2,969,309	14,289	1,982	14,718	74,020	2,984,027
AFTER	78,954,511	271,986	11,006,981	106,161	14,724	109,346	286,710	11,116,327

This represents a 12% savings of the fuel oil used in the three large buildings and a 22% savings in the total electric production (which includes, not only the buildings included in the study, but also the remaining buildings, outdoor lighting, etc.

8. Energy Plan

With respect to development of project documentation, the following decisions were reached:

1. All "D" category ECOs would be dropped from project documentation development.

2. All "C.6" category ECOs would also be dropped from project documentation development and implemented locally.

3. Projects would be grouped in five Productivity Capital Investment Program (more specifically Productivity Enhancing Capital Investment Program) packages as follows:

   P1 All BQs at Kwajalein - All ECOs
   P2 All BQs at Roi-Namur - All ECOs
   P3 All School Buildings - All ECOs
   P4 All "Other" Buildings - All "Humidity" package ECOs
   P5 All "Other" Buildings - All "Other" ECOs

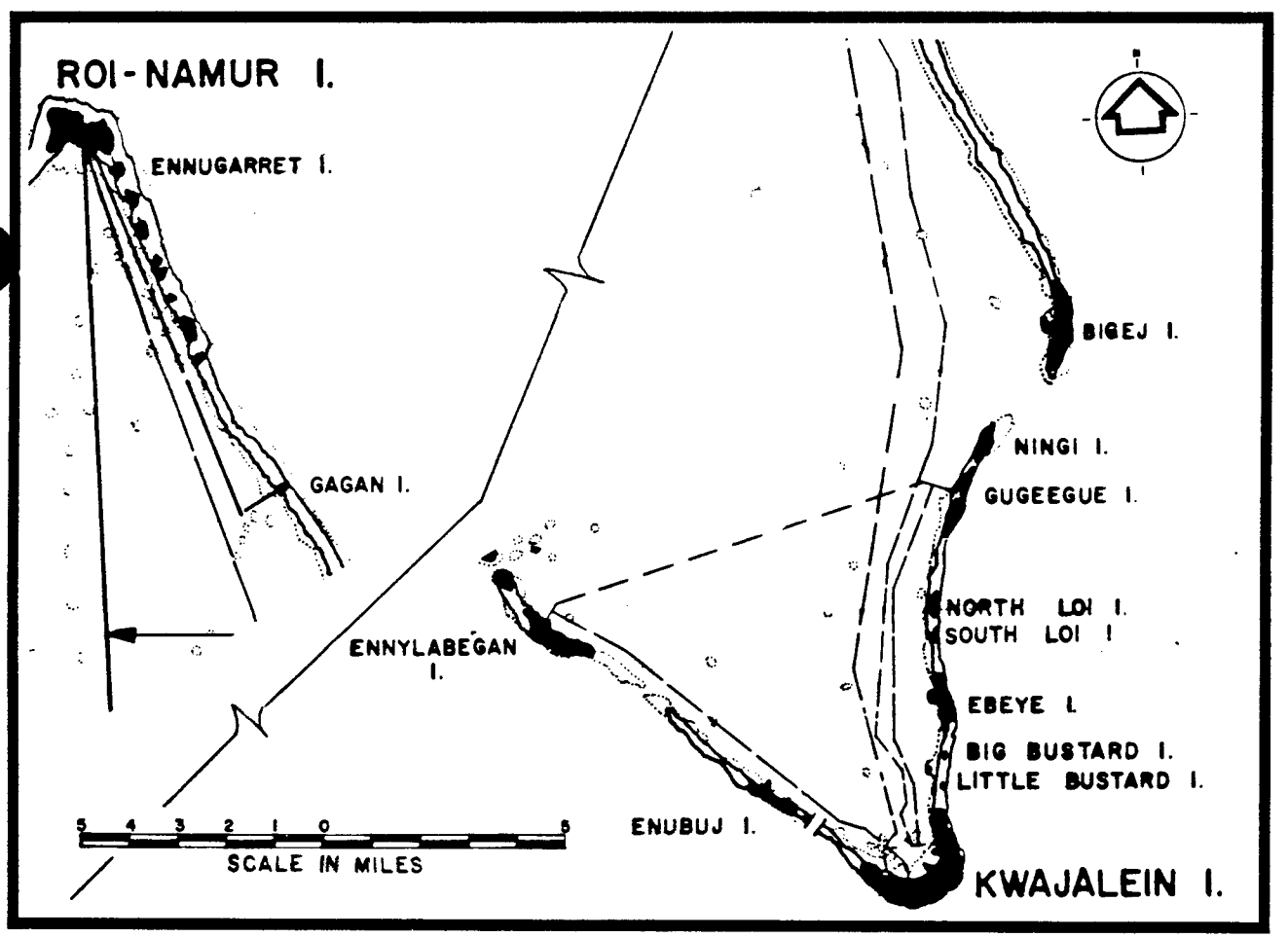
Details of the projects developed can be found in Appendix D.
The summary economics for these project groupings are, then (using the "new" electric and fuel oil costs):

PROJ	ELEC SAVE (KWH)	FUEL SAVE (GAL)	TOTAL ENERGY SAVE (MBTU)	(NEW) TOTAL DOLLAR SAVE	PROJ COST	SPB (YRS)
P1	2,527,991	0	8,628	360,239	1,148,428	3.2
P2	1,315,152	0	4,489	172,153	384,347	2.2
P3	1,186,829	0	4,051	169,123	230,927	1.4
P4	7,878,233	0	26,884	1,110,761	1,758,246	1.6
P5	7,416,839	7,519	26,355	1,053,517	2,803,675	2.7
TOT	**20,325,044**	**7,519**	**70,406**	**2,865,793**	**6,325,623**	**2.2**

CEHND-ED-ME
September 1989

2 December 1989
CEPOD-ED-MI

SCOPE OF WORK
FOR AN
ENERGY SAVINGS OPPORTUNITIES SURVEY (ESOS)
FOR
U.S. ARMY KWAJALEIN ATOLL
(Kwajalein and Roi-Namur Islands)



Performed as part of the
ENERGY ENGINEERING ANALYSIS PROGRAM (EEAP)

2 December 1989

SCOPE OF WORK
FOR AN
ENERGY SAVINGS OPPORTUNITIES SURVEY (ESOS)
U.S. ARMY KWAJALEIN ATOLL

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SCOPE OF WORK
FOR AN ENERGY SAVINGS OPPORTUNITY SURVEY (ESOS)
U.S. ARMY KWAJALEIN ATOLL

1. BRIEF DESCRIPTION OF WORK: The Contractor shall:

1.1 Review for general information any other energy studies which were performed at this installation.

1.2 Reevaluate selected projects and energy conservation opportunities (ECOs) from previous studies (if applicable) to determine their economic feasibility based on revised criteria, current site conditions and technical applicability.

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

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

1.5 Provide complete programming or implementation documentation for all recommended ECOs.

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

2. GENERAL

2.1 This study is intended to reevaluate energy conservation projects from previous studies which have not been implemented nor programmed for implementation and to identify/consider specific ECOs in buildings and areas that may have been overlooked previously or recently identified.

2.2 The information and analysis outlined herein are considered to be minimum essentials for adequate performance of this study.

2.3 The Contractor shall ensure that all methods of energy conservation which will reduce the energy consumption of the installation in compliance with the Energy Resources Management Plan including those

listed in Annexes A and B-1 have been considered and documented. All methods of energy conservation which are reasonable and practical shall be considered, including improvements of operational methods and procedures as well as the physical facilities. All energy conservation opportunities which produce energy or dollar savings shall be documented in this report. Any energy conservation opportunity considered infeasible shall also be documented in the report with reasons for elimination. A list of general energy conservation opportunities to be used when evaluating specific buildings or areas is included as Annex B-1 to this scope. Each ECOs shall be considered, evaluated and documented in the report. The list is not intended to be restrictive but only to assure that basic and generally repetitive opportunities are addressed in the report. Some of the energy conservation opportunities in Annex A may not be applicable to the specific building or area at this installation. A statement to that effect is all that is required.

2.4 The study shall include the energy consuming buildings or areas listed in Annex B-1. The work in the areas may be reduced somewhat by building repetition.

2.5 The study shall consider the use of all energy sources. The energy sources may include electricity, natural gas, liquefied petroleum gas, bulk oil, other oil products, steam when procured, gasoline, coal, solar, etc.

2.6 The "Energy Conservation Investment Program (ECIP) Guidance", described in letter from CEHSC-FU, dated 25 April 1988 and revised by letter from CEHSC-FU-P, dated 15 June 1989, establishes criteria for ECIP projects and shall be used for performing the economic analyses of all ECOs and projects. Construction cost escalation for DD Form 1391 submission shall be calculated using the guidelines contained in AR 415-17 and the latest Tri-Service MCP Index. The Tri-Service MCP Index, when updated, is contained in the latest applicable edition of the Engineer Improvement Recommendation System (EIRS) bulletin.

2.7 Energy conservation opportunities determined to be technically and economically feasible shall be developed into projects acceptable to installation personnel. This may involve combining similar ECOs into larger packages which will qualify for ECIP or MCA funding, and determining, in coordination with installation personnel, the appropriate packaging and implementation approach for all feasible ECOs.

2.8 Projects which qualify for ECIP funding shall be identified, separately listed, and prioritized by the Savings to Investment Ratio (SIR).

2.9 All feasible non-ECIP projects shall be ranked in order of highest to lowest SIR.

3. PROJECT MANAGEMENT

3.1 Project Managers. The Contractor shall designate a project manager to serve as a point of contact and liaison for work required under this contract. Upon award of this contract, the individual shall be immediately designated in writing. The Contractor's designated project manager shall be approved by the Contracting Officer prior to commencement of work. This designated individual shall be responsible for coordination of work required under this contract. The Contracting Officer will designate a project manager to serve as the Government's point of contact and liaison for all work required under this contract. This individual will be the Government's representative.

3.2 Installation Assistance. The Commanding Officer at each installation will designate an individual who will serve as the point of contact for obtaining information and assisting in establishing contacts with the proper individuals and organizations as necessary to accomplish the work required under this contract.

3.3 Public Disclosures. The Contractor shall make no public announcements or disclosures relative to information contained or developed in this contract, except as authorized by the Contracting Officer.

3.4 Meetings. Meetings will be scheduled whenever requested by the Contractor or the Contracting Officer for the resolution of questions or problems encountered in the performance of the work. The Contractor and/or the designated representative(s) shall be required to attend and participate in all meetings pertinent to the work required under this contract as directed by the Contracting Officer. These meetings, if necessary, are in addition to the presentation and review conferences.

3.5 Site Visits, Inspections, and Investigations. The Contractor shall visit and inspect/investigate the site of the project as necessary and required during the preparation and accomplishment of the work.

3.6 Records

3.6.1 The Contractor shall provide a record of all significant conferences, meetings, discussions, verbal directions, telephone conversations, etc., with Government representative(s) relative to this contract in which the Contractor and/or designated representative(s) thereof participated. These records shall be dated and shall identify the contract number, and modification number if applicable, participating personnel, subject discussed and conclusions reached. The Contractor shall forward to the Contracting Officer within ten calendar days, a reproducible copy of the records.

3.6.2 The Contractor shall provide a record of requests for and/or receipt of Government-furnished material, data, documents, information, etc., which if not furnished in a timely manner, would significantly impair the normal progression of the work under this contract. The records shall be dated and shall identify the contract number and modification number, if applicable. The Contractor shall forward to the Contracting Officer within ten calendar days, a reproducible copy of the record of request or receipt of material.

3.7 Interviews. The Contractor and the Government's representative shall conduct entry and exit interviews with the Directorate of Facilities Engineering before starting work at the installation and after completion of the field work. The Government's representative shall schedule the interviews at least one week in advance.

3.7.1 Entry. The entry interview shall thoroughly brief and describe the intended procedures for the survey and shall be conducted prior to commencing work at the facility. As a minimum, the interview shall cover the following points:

a. Schedules.

b. Names of energy analysts who will be conducting the site survey.

c. Proposed working hours.

d. Support requirements from the Directorate of Facilities Engineering.

3.7.2 Exit. The exit interview shall include a thorough briefing describing the items surveyed and probable areas of energy conservation.

The interview shall also solicit input and advice from the Directorates of Facilities Engineering and Oahu Consolidated Housing.Offices.

4. SERVICES AND MATERIALS. All services, materials (except those specifically enumerated to be furnished by the Government), plant, labor, superintendence and travel necessary to perform the work and render the data required under this contract are included in the lump sum price of the contract.

5. PROJECT DOCUMENTATION. All energy conservation opportunities which the Contractor has considered shall be included in one of the following categories and presented in the report as such:

5.1 ECIP Projects. To qualify as an ECIP project, an ECO, or several ECOs which have been combined, must have a construction cost estimate greater than $200,000, a Savings to Investment Ratio greater than one and a simple payback period of less than eight years. For ECAM and family housing projects, the $200,000 limitation may not apply. The Contractor shall check with the installation for guidance. The overall project and each discrete part of the project shall have a SIR greater than one. For all projects meeting the above criteria, complete programming documentation will be required. Programming documentation shall consist of a DD Form 1391, life cycle cost analysis summary sheet(s) (with necessary backup data to verify the numbers presented), and a project development brochure (PDB). A life cycle cost analysis summary sheet shall be developed for each ECO and for the overall project when more than one ECO is combined. For projects and ECOs reevaluated from the previous studies, the backup data shall consist of copies of the original calculations and analysis, with new pages revising the original calculations and analysis. In addition, the backup data shall include as much of the following as is available: the increment of work the project or ECO was developed under in the previous study, title(s) of the project(s), the energy to cost (E/C) ratio, the benefit to cost (B/C) ratio, the current working estimate (CWE), and the payback period. This information shall be included as part of the backup data. The purpose of this information is to provide a means to prevent duplication of projects in any future reports.

5.2 Non-ECIP Projects. Projects which normally do not meet ECIP criteria, but which have an overall SIR greater than one shall be documented. The life cycle cost analysis summary sheet shall be completed through and including line 6 for all projects or ECOs. Each shall be analyzed to determine if they are feasible even if they do not meet ECIP criteria. These ECOs or projects may not meet the nonenergy qualification

test. For projects or ECOs which meet this criteria, the life cycle cost analysis summary sheet, completely filled out, with all the necessary backup data to verify the numbers presented, a complete description of the project and the simple payback period shall be included in the report. Additionally, these projects shall have the necessary documentation prepared, in accordance with the requirements of the Government's representative, for one of the following categories:

a. Quick Return on Investment Program (QRIP). This program is for projects which have a total cost not over $100,000 and a simple payback period of two years or less.

b. OSD Productivity Investment Funding (OSD PIF). This program is for projects which have a total cost of more than $100,000 and a simple payback period of four years or less.

c. Productivity Enhancing Capital Investment Program (PECIP). This program is for projects which have a total cost of more than $100,000 and a simple payback period of four years or less. The above programs are all described in detail in AR 5-4, Change No. 1.

d. Regular Military Construction Army (MCA) Program. This program is for projects which have a total cost greater than $200,000 and a simple payback period of eight to twenty-five years. Projects or ECOs which qualify for this program shall be economically analyzed in accordance with the requirements for Special Directed Studies in Engineering Technical Letter (ETL) 1110-3-332.

e. Low Cost/No Cost Projects. These are projects which the Directorate of Facilities Engineering can perform using their resources.

5.3 Nonfeasible ECOs. All ECOs which the Contractor has considered but which are not feasible, shall be documented in the report with reasons and justifications showing why they were rejected.

6. DETAILED SCOPE OF WORK. The general Scope of Work is intended to apply to contract efforts for all Army installations included under this contract except as modified by the detailed Scope of Work for each individual installation. The detailed Scope of Work is contained in Annex B.

7. WORK TO BE ACCOMPLISHED.

7.1 Evaluate Selected ECOs. The Contractor shall consider/analyze the ECOs listed on the matrix for specific facilities indicated in Annex B-1. These ECOs shall be analyzed in detail to determine their feasibility. Savings to Investment Ratios shall be determined using current ECIP guidance. The necessary data required for these projects may not be available, requiring the Contractor to visit the installation to obtain any necessary information. The Contractor shall provide all data and calculations needed to support the recommended ECO. All assumptions shall be clearly stated. Calculations shall be prepared showing how all numbers in the ECO were figured. Calculations shall be an orderly step-by-step progression from the first assumption to the final number. Descriptions of the products, manufacturers catalog cuts, pertinent drawings and sketches shall also be included. A life cycle cost analysis summary sheet shall be prepared for each ECO and included as part of the supporting data. For ECOs which would replace the existing heating, ventilating, and air conditioning (HVAC) system or significantly change it (such as converting a multizone system to a variable air volume (VAV system)) the Contractor is required to run a computer simulation to analyze the system and to determine the energy savings. This requirement to use computer modeling applies only to heated and air conditioned or air conditioned only buildings which exceed 8,000 square feet or heated only buildings in excess of 20,000 square feet. The computer program shall analyze the building on an hour-by-hour basis rather than the bin data method or bin data to simulate an hour-by-hour analysis. Unless the Building Loads Analysis and System Thermodynamic (BLAST) program is used, the Contractor shall submit a sample computer run with an explanation of all input and output data and a summary of program methodology and energy evaluation capabilities for approval by the Contracting Officer prior to use of the program for analysis. The computer program used must be comparable to the BLAST program.

7.2 Perform a Limited Site Survey. The Contractor shall conduct a limited site survey to evaluate the buildings or areas listed in Annex B-1. The list of ECOs in Annex B-1 shall be used when evaluating these building or areas. This list is not intended to be restrictive but only to assure that these opportunities, as a minimum, are considered, discussed and documented in the report. The Contractor may be aware of other ECOs not included in Annex B-1 that will produce energy, manpower or dollar savings. These should be evaluated the same as the other ECOs. Each of the items shall be considered and discussed in the report. Those items on the list which are not practical, have been previously accomplished, are

inappropriate or can be eliminated from detailed analysis based on preliminary analysis shall be listed in the report along with the reason for elimination from further analysis. All potential ECOs which are not eliminated by preliminary considerations shall be thoroughly documented and evaluated as to technical and economic feasibility. The Contractor shall obtain all the necessary data to evaluate the ECOs by conducting a site survey. However, the Contractor is encouraged to use any data that may have been documented in a previous study. The Contractor shall document his site survey on forms developed for the survey, or standard forms, and submit these completed forms as part of the report. All test and/or measurement equipment shall be properly calibrated prior to its use.

7.3 Provide Programming or Implementation Documentation. For projects or ECOs reevaluated or developed during this study, complete programming or implementation documentation shall be prepared by the Contractor.

7.3.1 Programming Documentation. For projects or ECOs which meet ECIP criteria and which the installation wants to submit as an ECIP project, complete programming documentation shall be prepared. Complete programming documentation consists of DD Form 1391, Project Development Brochure (PDB) and supporting data. These forms shall be separate from the narrative report. They shall be bound similarly to the final report in a manner which will facilitate repeated disassembly and reassembly.

7.3.1.1 Military Construction Project Data (DD Form 1391). These documents shall be prepared in accordance with AR 415-15 and the supplemental requirements in Annex B. A complete DD Form 1391 shall be prepared for each project. The form shall include a statement that the project results from an EEAP study. Documents shall be complete as required for submission to higher DA headquarters. These programming documents will require review and signatures by the proper installation personnel. All documents shall be completed except for the required signatures.

7.3.1.2 Project Development Brochure (PDB). Preparation of the PDB requires the Contractor to delineate the functional requirements of the project as related to the specific site. The Contractor shall prepare PDBs in accordance with AR 415-20 and TM 5-800-3. Most projects will not require all the forms and checklists included in the Technical Manual (TM). Only that information needed for the project shall be included. The PDB-I

format described in the TM shall be used for whatever information is needed.

7.3.2 Implementation Documentation. For feasible projects or ECOs which normally do not meet ECIP criteria, implementation documentation shall be prepared. Each feasible project or ECO shall be individually packaged and fully documented and included as a separate section in the volume containing the programming documentation. Each project or ECO shall have a complete description of the changes required, economic justifications, sketches, and other backup data included as a section in the report. The documentation required will be as determined by the Government's representative. Documentation required will be in the categories listed in paragraph 5.2. For the QRIP, OSD PIF and PECIP projects, documentation shall be prepared in accordance with the requirements of AR 5-4, Change No. 1. A sample implementation document, consisting of a DA Form 5108-R, sketches and manufacturers data and a life cycle cost analysis summary sheet shall be submitted for review and approval. This sample shall be submitted with the interim submittal. This sample shall be approved before any other implementation documents are prepared. To the degree possible, the project or ECO selected for the sample submission shall be typical of the majority of subsequent projects to be submitted. The sample shall consist of complete implementation documents with primary emphasis on format and manner of presentation rather than precise accuracy of cost estimates and energy savings data. For MCA projects the documentation required shall be in accordance with paragraph 7.5.1 except that the economic analysis required by ETL 1110-3-332 shall be included in lieu of the ECIP life cycle cost analysis. For low cost/no cost projects which the Directorate of Facilities Engineering personnel can perform, the following information shall be provided:

a. Brief description of the project.

b. Brief description of the reasons for the modification.

c. Specific instructions for performing the modification.

d. Estimated dollar and energy savings per year.

e. Estimated manhours and labor and materials costs. Costs shall be calculated for the current calendar year and so marked. Manhours shall be listed by trade. For projects that would repair an existing system so that it will function properly, also include the estimated manhours by

trade and labor and material costs necessary to maintain the system in that condition. Some of the simple practical modifications may be developed on a per unit basis. An example of this type of modification would be the repair or replacement of steam traps on an as needed basis. As a rule, however, the Contractor should develop complete projects, if at all possible, rather than per unit modifications.

Separate sheets for each project showing the above information shall be prepared and included in the report.

7.4 Submittals, Presentations and Reviews. The work accomplished shall be fully documented by a comprehensive report. The report shall have a table of contents and be indexed. Tabs and dividers shall clearly and distinctly divide sections, subsections, and appendices. All pages shall be numbered. The Contractor shall give a formal presentation of all but the final submittal to installation, command, and other Government personnel. The Contractor shall prepare slides or view graphs showing the results of the study to date for his presentation. During the presentation, the personnel in attendance shall be given ample opportunity to ask questions and discuss any changes deemed necessary to the study. A review conference will be conducted the same day, following the presentation. Each comment presented at the review conference will be discussed and resolved or action items assigned. The Contractor shall provide the comments from all reviewers and written notification of the action taken on each comment to all reviewing agencies within three weeks after the review meeting. It is anticipated that each presentation and review conference will require approximately one working day. The presentation and review conferences will be at the installation on the date(s) agreeable to the Directorate of Facilities Engineering, the Contractor and the Government's representative. The Contracting Officer may require a resubmittal of any document(s), if such document(s) are not approved because they are determined by the Contracting Officer to be inadequate for the intended purpose.

7.4.1 Interim Submittal. An interim report shall be submitted for review after completion of the field survey and an analysis has been performed on all of the ECOs. The report shall indicate the work which has been accomplished to date, illustrate the methods and justifications of the approaches taken and contain a plan of the work remaining to complete the study. Calculations showing energy and dollar savings and SIRs of all the ECOs shall be included. The simple payback period of all ECOs shall be calculated and shown in the report. The Contractor shall submit the Scope of Work and any modifications to the Scope of Work as an appendix to the report. A narrative summary describing the work and

results to date shall be a part of this submittal. During the review period, the Government's representative shall coordinate with the Directorate of Facilities Engineering and provide the Contractor with direction for packaging or combining ECOs for programming purposes and also indicate the fiscal year for which the programming or implementation documentation shall be prepared. A sample implementation document (DA Form 5108-R, sketches and manufacturers data, life cycle cost analysis summary sheet and supporting data) for one project shall be submitted with this submittal for review and approval. The survey forms completed during this audit shall be submitted with this report. The survey forms only may be submitted in final form with this submittal. They should be clearly marked at the time of submis-sion that they are to be retained. They shall be bound in a standard three-ring binder which will allow repeated disassembly and reassembly of the material contained within.

7.4.2 Prefinal Submittal. The Contractor shall prepare and submit the prefinal report when all work under this contract is complete. The Contractor shall submit the Scope of Work for the installation studied and any modifications to the Scope of Work as an appendix to the submittal. The report shall contain a narrative summary of conclusions and recommendations, together with all raw and supporting data, methods used, and sources of information. The report shall integrate all aspects of the study. The report shall include an order of priority by SIR in which the recommended ECOs should be accomplished. The synergistic effects of all of the ECOs on one another shall have been determined and the results of the original calculations adjusted accordingly. Completed programming and implementation documents for all recommended projects shall be included. The programming and implementation documents shall be ready for review and signature by the installation commander. The prefinal report, separately bound Executive Summary and all appendices shall be bound in standard three-ring binders which will allow repeated disassembly and reassembly. The prefinal submittal shall be arranged to include (a) a separately bound Executive Summary to give a brief overview of what was accomplished and the results of this study using graphs, tables and charts as much as possible (See Annex D for minimum requirements), (b) the narrative report containing a copy of the Executive Summary at the beginning of the volume and describing in detail what was accomplished and the results of this study, (c) appendices to include the detailed calculations and all backup material and (d) the programming and implementa-tion documentation. A list of all projects and ECOs developed during this study shall be included in the Executive Summary and shall include the following data from the life cycle cost analysis summary sheet: the cost (construction plus SIOH), the annual energy savings (type

and amount), the annual dollar savings, the SIR, the simple payback period and the analysis date. For all programmed projects also include the year in which it is programmed and the programmed year cost.

7.4.3 Final Submittal. Any revisions or corrections resulting from comments made during the review of the prefinal report or during the presentation and review conference shall be incorporated into the final report. These revisions or corrections may be in the form of replacement pages, which may be inserted in the prefinal report, or complete new volumes. Pen and ink changes or errata sheets will not be acceptable. If replacement pages are to be issued, it shall be clearly stated with the prefinal submittal that the submitted documents will be changed only to comply with the comments made during the prefinal conference and that the volumes issued at the time of the prefinal submittal should be retained. Failure to do so will require resubmission of complete volumes. If new volumes are submitted, they shall be in standard three-ring binders and shall contain all the information presented in the prefinal report with any necessary changes made. Detailed instructions of what to do with the replacement pages should be securely attached to the replacement pages.

ANNEX A

GENERAL ENERGY CONSERVATION OPPORTUNITIES

- Insulation (wall, roof, pipe, duct, etc.)
- Insulated glass or double glazed windows
- Weather stripping & caulking
- Insulated panels
- Solar films
- Vestibules
- Load dock seals
- Reduction of glass area
- Replace kitchen light fixtures
- Shutdown energy to hot water heaters or modify controls
- Energy conserving fluorescent lamps and ballast
- Reduce lighting levels
- Replace incandescent lighting
- Use more efficient lighting source
- Improve power factor
- High efficiency motor replacement
- Night setback/setup thermostats
- Infrared heaters
- Economizer cycles (dry bulb)

- o Control hot water circulation pump
- o FM radio controls
- o Radiator controls
- o Decentralize domestic hot water heaters
- o Install shower flow restrictors or limited flow showerheads (2 to 3 GPM)
- o Heat reclaim from hot refrigerant gas
- o Reduce air flow
- o Prevent air stratification
- o Install time clocks
- o Boiler oxygen trim control (fixed or portable)
- o Revise boiler controls
- o Chiller replacement
- o Chiller controls
- o Replace absorption chiller
- o Reduce street lights
- o Insulate steam and condensate lines
- o Return condensate
- o Heat reclaim from family housing condenser units for preheating of domestic hot water
- o Domestic hot water heat pumps
- o Transformer overvoltage
- o Transformer loading

- o Revise or repair building HVAC controls
- o Waste heat recovery
- o Thermal storage
- o Steam trap inspection
- o Instantaneous hot water heater
- o Air curtains
- o Occupancy sensors to control lighting or HVAC
- o Reflectors for fluorescent fixtures
- o Water spray roof cooling
- o Photocells to control lighting
- o Low emissivity windows
- o Separate switches to control lighting arrangements

ANNEX B

1. A general Energy Saving Opportunities Survey (ESOS) shall be conducted for U.S. Army Kwajalein Atoll. The facilities, descriptions, and ECOs to be considered are listed at Annex B-1. The evaluation should include but not be limited to the energy conservation opportunities indicated in Annex B-1.

2. Report submittals and reviews: Documents will be submitted in accordance with the following:

Submittal	Calendar Days After NTP	Govt Review Calendar Days	No. of Copies
a. Interim	120	30	12
b. Prefinal	210	30	12
c. Final	270	NA	13 + 1 extra cpy Exec. Sum.

3. Distribution of report: The contractor will make distribution of the interim, prefinal and final reports with a forwarding letter requesting that addressees review and return comments within the above specified Government review period to:

Commander
U.S. Army Engineer Division, Pacific Ocean
ATTN: CEPOD-ED-MI (Mr. Lindsey)
Bldg 230
Fort Shafter, HI 96858-5440

a. Distribution as follows:

(1) Seven (7) copies to: Commander
U.S. Army Kwajalein Atoll
ATTN: CSSD-KLE (Mr. Ganus)
P.O. Box 26, APO, San Francisco 96555

(4) Five (5) copies to: Commander
U.S. Army Engineer Division,
Pacific Ocean
ATTN: CEPOD-ED-MI (Mr. Lindsey)

Bldg 230,
Fort Shafter, HI 96858-5440

b. One copy of the completed final report with a cover letter identifying the project shall be sent to:

Mobile District
CESAM-EN-CC
P.O. Box 2288
Mobile, AL 36693

c. One copy of the executive summary shall be sent to:

Commander
U.S. Army Corps of Engineers
ATTN: CEEC-EE (Mr. D. Beranek)
Washington, D.C. 20314-1000

Commander
U.S. Army Logistics Evaluation Agency
ATTN: LOEA-PL (Mr. Keath)
New Cumberland Army Depot
New Cumberland, PA 17070-5007

4. PAYMENTS. Monthly payment shall be made on the Contractor's estimate of work accomplished upon submission on ENG Form 93, Payment Estimate-Contract Performance. This form shall include Contractor's certification that the payment estimate is correct and just, and the requested payment has not been received. In addition, with each certified payment request, the Contractor shall submit a concise progress report delineating work completed and problems encountered. The Contracting Office requires the Contractor billings be submitted to U.S. Army Engineer Division, Pacific Ocean, ATTN: CEPOD-ED-MI by the 15th of each month. Upon approval, payment shall be made of ninety (90) percent of the amount as determined above. Upon satisfactory completion of all work under this contract, the Contractor will be paid the unpaid balance of any money due including ten (10) percent retained in previous payments.

5. USE OF INFORMATION. The information developed, gathered, assembled and reproduced by the Contractor or his Consultants, Sub-Contractors or their associates in fulfillment of the contract requirements as defined or related to the Scope of Work will become the complete property of the Government and will, therefore, not be used by the Contractor for any purpose at any time without the written consent of the Contracting Officer.

6. GOVERNMENT PROJECT MANAGER. The Government has designated a Project Manager within the Pacific Ocean Division (POD) who will serve as the main point of contact for the Contracting Officer: David Lindsey,

telephone 438-6938. The Project Manager will serve as the designated Government Representative for the Contracting Officer.

7. USAKA POINT OF CONTACT. The USAKA coordinator to serve as the point of contact and liaison for all work is: Mr. Bobby Ganus, telephone 480-3777, U.S. Army Kwajalein Atoll. The USAKA coordinator will be responsible for arranging clearance into the site for field investigation.

8. COORDINATION. During the prosecution of the work, close liaison shall be maintained with the Government POD representative who will coordinate the work with other elements of USAKA. All correspondence and submittals will be coordinated through POD. All routine correspondence concerning field information, access, interface with utilities, etc., will be made directly with the organizations involved. However, the Government POD representative will be kept informed of all coordination being made. All required coordination of a special nature will be made through the designated Government POD representative only. Under no circumstances will any information concerning any matters directly related to the criteria, scope, scheduling or progress of projects under this Scope of Work be divulged to any individual or organization without specific approval of the Contracting Officer or the designated Government POD Representative. All requests made by the Using Service and other agencies shall be referred to the designated Government POD Representative. Arrangements for visits to office of the Using Service, meetings, and coordination (other than routine) as required with other agencies will be made by the designated Government POD Representative upon request.

10. QUALITY REQUIREMENTS. The Contractor is responsible for the quality of all work accomplished under this contract. The review and checking of documents by USAKA and POD does not relieve the Contractor of any responsibility. If errors are discovered at a later date, the Contractor shall be required to make necessary changes or perform other corrective action. Completed work will be transmitted by a letter signed by a principal of the firm certifying that all information has been coordinated and is complete and correct.

11. REFERENCES/GOVERNMENT FURNISHED INFORMATION. The following references apply to energy considerations and will be furnished by the Government at the specific request of the Contractor on a case by case basis for the period of the contract:

a. Energy Resources Management Plan

b. Engineer Technical Letters (ETLs) 1110-3-254, Use of Electric Power for Comfort Space Heating; 1110-3-282, Energy Conservation; and 1110-3-332, Economic Studies.

c U.S. Army Corps of Engineers, Architectural and Engineering Instructions Design Criteria, 13 March 1987.

d. Energy Conservation Investment Program (ECIP) Guidance, dated 25 April 1988 and 15 June 1989.

e. Technical Manual - TM 5-785, Engineering Weather Data, TM 5-800-2, General Criteria Preparation of Cost Estimates, and TM 5-800-3, Project Development Brochure.

f. AR 415-15, Military Construction Army (MCA) Program Development, AR 415-17, Cost Estimating for Military Programming, AR 415-20, Construction, Project Development and Design Approval, AR 415-28, Department of the Army Facility Classes and Construction Categories, AR 415-35 Construction, Minor Construction, AR 420-10, General Provisions, Organization, Functions, and Personnel, and AR 5-4, Change No. 1, Department of the Army Productivity Improvement Program and AR 11-27, Army Energy Program.

g. Engineer Improvement Recommendation System (EIRS) Bulletin 84-01 and Tri-Service Military Construction Program (MCP) Index (Most current edition).

12. All ECIP projects will be based on the fiscal year established subsequent to the Interim Review Conference for cost estimation, programming and implementation.

13. Thirty-five millimeter (35mm) color slides will be provided for ECIP projects reflecting existing conditions which can be used as supporting documentation for ECIP project approval.

14. A computer program titled Life Cycle Costing in Design (LCCID) is available from the Blast Support Office in Urbana, Illinois for a nominal fee. This computer program shall be used for performing the economic calculations for ECIP and non-ECIP ECOs. The Blast Support Office can be contacted at 144 Mechanical Engineering Building, 1206 West Green Street, Urbana, Illinois 61801. The telephone number is (217) 333-3977.

ANNEX B-1

LIST OF BUILDINGS
AND
SELECTED ENERGY CONSERVATION OPPORTUNITIES

(Kwajalein and Roi-Namur)

BUILDING INFORMATION SCHEDULE

FAC. NUM - Facility Number

TC - Indicates Type of Construction
"P"ermanent
"S"emi-permanent
"T"emporary

CATEGORY CODE - Indicates the numerical code for identifying and classifying Real Property usage. Category Code identification can be found in AR 415-28.

TOTAL AREA - Indicates the total area of the facility, including appurtenances as applicable. Given in square feet.

FL - Indicates the number of floors in the facility

EXT LIFE - Indicates the year the estimated economic life of the facility is expected to terminate.

CONSTRUCTION MATERIALS - Indicates the primary type of construction material used for the facility's foundation/floor, wall, and roof. Definitions are as follows:

A = Wood
B = Clay or Cocrete Brick
C = Concrete
D = Slag or Concrete Block
E = Stone
F = Structural Tile
S = Cement Asbestos
G = Steel
H = Other
I = Cast Iron
L = Reinforced Concrete
N = Aluminum/Metal
P = Translucent Mtl

CURRENT USE DESCRIPTION/FAC NAME - Self Explanatory

Note: The Contractor shall conduct a limited site survey of the facilities listed. Similar type buildings have been grouped together to aid the Contractor in establishing a representative sample for his survey. A detailed survey shall be conducted of a representative facility in each group and the results applied to the other facilities within that group.

BUILDING LISTING FOR KWAJALEIN

FAC. NUM	T C	CATEGORY CODE	TOTAL AREA	# FL	YR. BUILT	EXT. LIFE	CONSTRUCT MATERIALS FOUN.	WALL	ROOF	CURRENT USE DESCRIPTION/FAC NAME
102	P	711-60	4,050	2	1955	1985	C	F	C	Family Quarters, Bdrm 2/2, Ocean Road
103	P	711-60	1,814	1	1954	1984	C	F	C	Family Quarters, Bdrm 3, Lagoon Road
104	P	711-60	2,914	1	1954	1984	C	F	C	Family Quarters, Bdrm 1/1, Ocean Road
105	P	711-60	3,515	1	1954	1984	C	F	C	Family Quarters, Bdrm 3/3, Lagoon Road
106	P	711-60	3,446	1	1954	1984	C	F	C	Family Quarters, Bdrm 3/3, Lagoon Road
202	P	711-60	1,716	1	1954	1984	C	F	C	Family Quarters, Bdrm 3, Ocean Road
225	P	711-13	1,745	1	1956	1986	C	F	C	Family Quarters, Bdrm 3, Ocean Road
203	P	711-60	4,050	1	1955	1985	C	F	C	Family Quarters, Bdrm 2/3, Lagoon Road
207	P	711-60	4,050	2	1955	1985	C	F	C	Family Quarters, Bdrm 3/2, Lagoon Road
208	P	711-60	4,050	2	1955	1985	C	F	C	Family Quarters, Bdrm 3/2, Sprint Loop
209	P	711-60	4,050	2	1955	1985	C	F	C	Family Quarters, Bdrm 2/2, Sprint Loop
210	P	711-60	4,050	2	1955	1985	C	F	C	Family Quarters, Bdrm 2/2, Sprint Loop
211	P	711-60	4,050	2	1955	1985	C	F	C	Family Quarters, Bdrm 2/3, Lagoon Road
212	P	711-60	4,050	2	1955	1985	C	F	C	Family Quarters, Bdrm 2/2, Sprint Loop
214	P	711-60	4,050	2	1955	1985	C	F	C	Family Quarters, Bdrm 3/3, Sprint Loop
204	P	711-60	2,914	1	1954	1984	C	F	C	Family Quarters, Bdrm 1/1, Lagoon Road
205	P	711-60	3,446	2	1955	1985	C	F	C	Family Quarters, Bdrm 2/2, Lagoon Road
215	P	711-60	3,446	2	1955	1985	C	F	C	Family Quarters, Bdrm 3/2, Lagoon Road
217	P	711-60	3,446	2	1955	1985	C	F	C	Family Quarters, Bdrm 3/2, Lagoon Road
219	P	711-60	3,446	2	1955	1985	C	F	C	Family Quarters, Bdrm 3/3, Lagoon Road
206	P	711-60	3,515	1	1954	1984	C	F	C	Family Quarters, Bdrm 3/3 Ocean Road
213	P	711-60	3,515	1	1954	1984	C	F	C	Family Quarters, Bdrm 3/3, Sprint Loop
216	P	711-60	3,515	1	1955	1985	C	F	C	Family Quarters, Bdrm 3/3, Ocean Road
222	P	711-60	3,096	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Speedball Lane
223	P	711-60	3,096	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Lagoon Road
224	P	711-60	3,096	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Speedball Lane
226	P	711-60	3,096	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Ocean Road
227	P	711-60	3,096	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Ocean Road
228	P	711-60	3,096	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Lagoon Road
229	P	711-60	3,096	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Ocean Road

BUILDING LISTING FOR KWAJALEIN

FAC. NUM	T C	CATEGORY CODE	TOTAL AREA	# FL	YR BUILT	EXT. LIFE	CONSTRUCT MATERIALS FOUN.	WALL	ROOF	CURRENT USE DESCRIPTION/FAC NAME
241	P	711-12	3,726	1	1945	1975	C	F	C	Family Quarters, Bdrm 4, USAKA CO, Ocean Road
401	P	711-60	5,512	2	1952	1982	C	F	C	Family Quarters, Bdrm 2/2/1/3, Lagoon Road
402	P	711-60	5,512	2	1952	1982	C	F	C	Family Quarters, Bdrm 2/2/1/3, Pine Street
403	P	711-60	6,295	2	1952	1982	C	F	C	Family Quarters, Bdrm 2/2/2/1/3, Lagoon Road
404	P	711-60	5,644	2	1952	1982	C	F	C	Family Quarters, Bdrm 3/2/1/3, Pine Street
405	P	711-60	4,648	2	1954	1984	C	F	C	Family Quarters, Bdrm 3/2/2/3, Taro Street
411	P	711-60	4,648	2	1954	1984	C	F	C	Family Quarters, Bdrm 3/2/2/3, Taro Street
422	P	711-60	4,648	2	1955	1985	C	F	C	Family Quarters, Bdrm 3/2/2/3, Pine Street
424	P	711-60	4,648	2	1955	1985	C	F	C	Family Quarters, Bdrm 3/2/2/3, Lagoon Road
437	P	711-60	4,760	2	1956	1986	C	F	C	Family Quarters, Bdrm 3/2/2/3, Poinsettia Street
440	P	711-60	4,760	2	1956	1986	C	F	C	Family Quarters, Bdrm 3/2/2/3, Poinsettia Street
450	P	711-60	4,760	2	1956	1986	C	F	C	Family Quarters, Bdrm 3/2/2/3, Poinsettia Street
451	P	711-60	4,760	2	1956	1986	C	F	C	Family Quarters, Bdrm 3/2/2/3, Heliotrope Street
458	P	711-60	4,760	2	1956	1986	C	F	C	Family Quarters, Bdrm 3/2/2/3, Poinsettia Street
459	P	711-60	4,760	2	1956	1986	C	F	C	Family Quarters, Bdrm 3/2/2/3, Poinsettia Street
478	P	711-60	4,760	2	1956	1986	C	F	C	Family Quarters, Bdrm 3/2/2/3, Heliotrope Street
482	P	711-60	4,760	2	1956	1986	C	F	C	Family Quarters, Bdrm 3/2/2/3, Heliotrope Street
485	P	711-60	4,670	2	1956	1986	C	F	C	Family Quarters, Bdrm 3/2/2/3, Heliotrope Street
487	P	711-60	4,670	2	1956	1986	C	F	C	Family Quarters, Bdrm 3/2/2/3, Poinsettia Street
406	P	711-60	2,078	2	1954	1984	C	F	C	Family Quarters, Bdrm 2/2, Pine Street
408	P	711-60	2,078	2	1954	1984	C	F	C	Family Quarters, Bdrm 2/2, Pine Street
410	P	711-60	2,078	2	1954	1984	C	F	C	Family Quarters, Bdrm 2/2, Pine Street
412	P	711-60	2,078	2	1954	1984	C	F	C	Family Quarters, Bdrm 2/2, Pine Street
414	P	711-60	2,078	2	1954	1984	C	F	C	Family Quarters, Bdrm 2/2, Pine Street
415	P	711-60	2,078	2	1953	1983	C	F	C	Family Quarters, Bdrm 2/2, Taro Street
416	P	711-60	2,078	2	1954	1984	C	F	C	Family Quarters, Bdrm 2/2, Pine Street
417	P	711-60	2,078	2	1954	1984	C	F	C	Family Quarters, Bdrm 2/2, Taro Street
418	P	711-60	2,078	2	1954	1984	C	F	C	Family Quarters, Bdrm 2/2, Pine Street
419	P	711-60	2,078	2	1954	1984	C	F	C	Family Quarters, Bdrm 2/2, Taro Street
421	P	711-60	2,078	2	1955	1985	C	F	C	Family Quarters, Bdrm 2/2, Lagoon Road
423	P	711-60	2,078	2	1955	1985	C	F	C	Family Quarters, Bdrm 2/2, Lagoon Road
425	P	711-60	2,078	2	1955	1985	C	F	C	Family Quarters, Bdrm 2/2, Lagoon Road
426	P	711-60	2,078	2	1955	1985	C	F	C	Family Quarters, Bdrm 2/2, Lagoon Road
427	P	711-60	2,078	2	1955	1985	C	F	C	Family Quarters, Bdrm 2/2, Lagoon Road

BUILDING LISTING FOR KWAJALEIN

FAC. NUM	T C	CATEGORY CODE	TOTAL AREA	# FL	YR. BUILT	EXT. LIFE	CONSTRUCT MATERIALS FOUN.	WALL	ROOF	CURRENT USE DESCRIPTION/FAC NAME
430	P	711-60	2,078	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Lagoon Road
431	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Poinsettia Street
432	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Poinsettia Street
433	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Lagoon Road
434	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Lagoon Road
435	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Poinsettia Street
436	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Poinsettia Street
438	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Poinsettia Street
439	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Poinsettia Street
445	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Heliotrope Street
446	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Poinsettia Street
447	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Heliotrope Street
448	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Poinsettia Street
449	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Heliotrope Street
452	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Poinsettia Street
453	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Heliotrope Street
454	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Poinsettia Street
455	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Heliotrope Street
456	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Poinsettia Street
457	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Poinsettia Street
461	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Poinsettia Street
463	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Poinsettia Street
466	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Lagoon Road
468	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Lagoon Road
470	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Heliotrope Street
472	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Heliotrope Street
474	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Heliotrope Street
476	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Heliotrope Street
480	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Heliotrope Street
484	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Heliotrope Street
486	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, Poinsettia Street
496	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, 5th Street
497	P	711-60	2,124	2	1956	1986	C	F	C	Family Quarters, Bdrm 2/2, 5th Street
407	P	711-60	1,946	1	1953	1983	C	F	C	Family Quarters, Bdrm 1/1, Taro Street
409	P	711-60	1,946	1	1953	1983	C	F	C	Family Quarters, Bdrm 1/1, Taro Street
413	P	711-60	1,946	1	1954	1984	C	F	C	Family Quarters, Bdrm 1/1, Taro Street
420	P	711-60	2,312	1	1954	1984	C	F	C	Family Quarters, Bdrm 3/3, Taro Street
428	P	711-60	2,444	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Lagoon Road

BUILDING LISTING FOR KWAJALEIN

FAC. NUM	T C	CATEGORY CODE	TOTAL AREA	# FL	YR BUILT	EXT. LIFE	CONSTRUCT MATERIALS FOUN.	WALL	ROOF	CURRENT USE DESCRIPTION/FAC NAME
429	P	711-60	2,444	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Poinsettia Street
441	P	711-60	2,444	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Heliotrope Street
442	P	711-60	2,444	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Poinsettia Street
460	P	711-60	2,444	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Lagoon Road
462	P	711-60	2,444	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Lagoon Road
464	P	711-60	2,444	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Lagoon Road
465	P	711-60	2,444	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Poinsettia Street
467	P	711-60	2,444	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Palm Street
469	P	711-60	2,444	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Palm Street
471	P	711-60	2,444	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Palm Street
473	P	711-60	2,444	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Palm Street
475	P	711-60	2,444	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Palm Street
477	P	711-60	2,444	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Palm Street
479	P	711-60	2,444	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Palm Street
481	P	711-60	2,444	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Palm Street
483	P	711-60	2,444	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Palm Street
488	P	711-60	2,444	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Poinsettia Street
489	P	711-60	2,444	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Poinsettia Street
490	P	711-60	2,444	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Ocean Road
491	P	711-60	2,444	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Ocean Road
492	P	711-60	2,444	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Ocean Road
493	P	711-60	2,444	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Ocean Road
494	P	711-60	2,444	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Ocean Road
495	P	711-60	2,444	1	1956	1986	C	F	C	Family Quarters, Bdrm 3/3, Ocean Road
704	P	721-40	115,120	3	1952	1982	C	F	C	Pacifis Barracks (occupies 2 wings)
	P	740-53	15,447	3	1952	1982	C	F	C	Macy's Retail Store, Wing A Ground Floor
	P	740-62	5,920	3	1952	1982	C	F	C	Snack Bar, Wing A, Ground Floor
	P	730-73	3,042	3	1952	1982	C	F	C	Post Office, Wing A, Ground Floor
	P	740-06	1,957	3	1952	1982	C	F	C	Back of Guam, Wing A, Ground Floor
	P	610-30	1,620	3	1952	1982	C	F	C	Macy's retail (Merchandising) Office
	P	740-34	1,310	3	1952	1982	C	F	C	PBQ Weight room, Wing B, Ground Floor
501	P	724-30	12,424	2	1951	1981	C	F	C	Surf Bachelor Quarters (Women's BQ)
560	P	724-30	10,000	2	1973	2003	C	F	C	Qcean Bachelor Quarters, 7th Street
561	P	724-30	17,640	3	1967	1997	C	F	C	Palm Bachelor Quarters
562	P	724-30	27,300	3	1967	1997	C	F	C	Shell Bachelor Quarters

BUILDING LISTING FOR KWAJALEIN

FAC. NUM	T C	CATEGORY CODE	TOTAL AREA	# FL	YR. BUILT	EXT. LIFE	CONSTRUCT MATERIALS FOUN.	WALL	ROOF	CURRENT USE DESCRIPTION/FAC NAME
563	P	724-30	30,746	3	1967	1997	C	F	C	Coral Bachelor Quarters
564	P	724-30	40,792	3	1967	1997	C	F	C	Reef Bachelor Quarters
565	P	724-30	25,796	3	1967	1997	C	F	C	Sands Bachelor Quarters
519			660							Trailers (254 total)
502	P	740-90	17,435	1	1952	1982	C	F	C	Yokwe Yuk Club, 6th Street
301	P	740-21	8,849	1	1953	1983	C	F	C	Surfway Foodstore
351	P	730-48	6,257	1	1962	1982	C	N	N	George Seitz School Classroom Bldg
352	P	730-48	16,536	1	1962	1982	C	F	N	George Seitz Elementary School,Main Bldg
357	P	730-48	2,414	2	1969	1999	C	F	C	George Seitz School, Classroom Bldg
	P	540-10	2,413	2	1969	1999	C	F	C	Dental Clinic (located on 2nd Floor)
360	P	730-49	4,710	1	1969	1999	C	F	C	Kwajalein Jr-Sr High School, Admin/Lib.
361	P	730-49	5,950	1	1969	1999	C	F	C	Kwajalein Jr-Sr High School, Classrooms
362	P	730-49	21,400	1	1969	1999	C	F	C	Kwajalein Jr-Sr High School, Multi-Purpose Bldg
363	P	740-68	11,945	1	1985	2015	C	L	L	Corlett Recreation Center
602	P	442-70	49,610	2	1952	1982	C	F	C	GSK (General Stores Kwajalein)
	P	141-33	15,530	2	1952	1982	C	F	C	LEC Shipping and Receiving
	P	610-23	6,400	2	1952	1982	C	F	C	Supply Division Administration, LEC
603	P	510-10	20,373	2	1951	1981	C	F	C	Kwajalein Hospital
607	P	213-30	7,884	2	1983	2013	C	L	L	Marine Maintenance Shops
	P	610-90	2,516	2	1983	2013	C	L	L	Marine Department Administration
	P	137-90	201		1983	2013	C	N	N	Harbor Control Tower

BUILDING LISTING FOR KWAJALEIN

FAC. NUM	T C	CATEGORY CODE	TOTAL AREA	# FL	YR BUILT	EXT. LIFE	CONSTRUCT MATERIALS FOUN.	WALL	ROOF	CURRENT USE DESCRIPTION/FAC NAME
700	P	610-50	2,560	1	1968	1988	C	N	N	LEC Administration Office
703	P	740-46	29,630	1	1952	1982	C	F	C	Pacific Dining Room and Bakery
710	P	730-30	9,035	1	1954	1984	C	F	C	Laundry-Dry Cleaning Plant/Cobbler Shop
717	P	730-30	1,036	1	1970	1990	C	N	N	Launderette
782	P	740-50	2,525	1	1963	1983	C	N	N	Macy's West (Retail Store Annex)
786	P	740-50	4,260	1	1969	1989	C	N	N	Ten-Ten Store
803	P	218-90	23,087	1	1954	1984	C	D	C	Heavy Equipment/Generator Repair Bldg
804	P	219-10	23,809	2	1954	1984	D	D	D	LEC FOM Maintenance Shops
	P	610-50	2,400	2	1954	1984	C	F	C	LEC FOM Administration Office
	P	610-21	2,400	2	1954	1984	C	F	C	LEC Facilities Engineering Office
805	P	740-11	7,861	2	1954	1984	C	F	C	Bowling Alley, 1st Floor
	P	740-41	2,924	2	1954	1984	C	F	C	Grace Sherwood Library, 2nd Floor
	P	610-50	1,536	2	1954	1984	C	F	C	SLEC Administrative Office, 2nd Floor
	P	610-90	1,250	2	1954	1984	C	F	C	Hourglass (newspaper) Office, 2nd Floor
	P	730-90	1,150	2	1954	1984	C	F	C	Radio/TV (AFRTS) Station, 2nd Floor
	P	740-90	100	2	1954	1984	C	F	C	Recreation Services Gear Locker, 1st Floor
	P	610-50	730	2	1954	1984	C	F	C	Recreation Services Office, 2nd Floor
	P	740-03	700	2	1954	1984	C	F	C	Recreation Services Photo lab, 1st Floor
806	P	610-31	8,126	1	1953	1983	C	F	C	Instrument Control Center
808	P	214-30	18,160	1	1953	1983	C	F	C	Automotive Maintenance Shops
	P	610-50	2,268	1	1953	1983	C	F	C	Automotive Administrative Office, LEC
	P	442-70	8,153	1	1953	1983	C	F	C	Automotive Supply
813	P	218-90	8,000	1	1971	1991	C	N	N	FOM Carpenter Shop
815	P	740-90	3,840	1	1968	1988	C	N	N	Arts & Crafts Center, Rec Services
605	P	442-60	16,268	1	1952	1972	C	A	S	Warehouse, Transit Cargo (on Cargo Pier)
879	P	740-15	6,240	2	1962	1992	C	E	A	Country Club (Golf Club house) Kwajalein

BUILDING LISTING FOR KWAJALEIN

FAC. NUM	T C	CATEGORY CODE	TOTAL AREA	# FL	YR BUILT	EXT. LIFE	CONSTRUCT MATERIALS FOUN.	WALL	ROOF	CURRENT USE DESCRIPTION/FAC NAME
900	P	211-20	22,900	1	1956	1986	C	C	C	Aviation maintenance Shops
	P	610-27	3,000	1	1956	1986	C	C	C	Finance/ADP Department
	P	218-90	2,900	1	1956	1986	C	C	C	Avionics, LEC
901	P	610-11	16,158	3	1954	1984	C	F	C	USAKA Headquarters, 2nd and 3rd floors
	P	141-10	9,967	3	1954	1984	C	F	C	Air terminal, 1st floor
	P	610-28	1,260	3	1954	1984	C	F	C	SLEC Operations
	P	610-50	1,379	3	1954	1984	C	F	C	RMI Administration Office
902	P	218-90	3,593	1	1953	1983	C	F	C	Aircraft Survival Equipment Shop
904	P	730-10	10,682	2	1953	1983	C	F	C	Kwajalein Firestation
907	P	133-60	4,228	1	1953	1983	C	D	N	Weather Station Building
933	P	841-90	8,000	1	1965	1985	C	N	N	Desalination Equipment Bldg
976	P	740-15	6,472	1	1957	1977	C	N	N	Veterans Hall/Shrine Club bldg
988	P	317-20	22,260	2	1960	1990	C	F	N	Range Calibration Lab and Warehouse
1002	P	141-30	12,639	1	1954	1984	C	F	C	USAKA Photo Lab
1008	P	131-20	16,156	1	1961	1991	C	D	C	Communication Center (w/emerg. gen)
1009	P	610-60	11,520	1	1962	1992	C	F	C	USAKA Range Operations Bldg
1010	P	610-60	86,607	2	1960	1990	C	F	C	Range Command Bldg
1011	P	317-20	9,302	2	1960	1990	C	F	N	Range Safety Center (TTR-4)
1013	P	811-10	21,248	2	1961	1991	C	F	N	Power Plant #2
1017	P	131-60	11,801	1	1961	1991	C	F	N	HF Transmitter Bldg
1057	P	442-20	4,040	1	1962	1982	C	N	N	Fire Prevention Office/Equipment Maint.
1060	P	442-20	3,580	1	1966	1986	C	C	C	Warehouse, AOA Environmental Control
1067	P	442-30	7,696	2	1963	1983	C	N	N	Supply Bulk Storage

BUILDING LISTING FOR KWAJALEIN

FAC. NUM	T C	CATEGORY CODE	TOTAL AREA	# FL	YR. BUILT	EXT. LIFE	CONSTRUCT MATERIALS FOUN.	WALL	ROOF	CURRENT USE DESCRIPTION/FAC NAME
	P	217-10	1,440	2	1963	1983	C	N	N	Machine Shop
1099	P	310-90	3,317	1	1976	1996	C	N	N	AN/FPQ-19 Radar Complex
1100	P	312-90	1,200	1	1982	2012	C	C	C	AN/FPQ-19 Radar Bldg
1228	P	831-10	16,576	2	1980	2010	C	C	C	Sewage Treatment Plant, Office and Lab
1310	P	442-20	3,234	1	1964	1994	C	D	C	AOA Admin Office
1659	P	133-90	1,564	1	1969	1999	C	F	C	TACAN Bldg (w/ emerg. gen)
1740	P	740-33	4,000	1	1965	1985	C	N	N	Ivey Hall Community Bldg
1759	P	610-50	4,080	1	1964	1984	C	N	N	Work Control Bldg
1762	P	740-74	1,018	1	1945	1955	C	A	A	Scout Clubhouse

BUILDING LISTING FOR ROI-NAMUR

FAC. NUM.	T C	CATEGORY CODE	TOTAL AREA	# FL	YR. BUILT	EXT. LIFE	CONSTRUCT MATERIALS FOUN.	WALL	ROOF	CURRENT USE DESCRIPTION/FAC NAME
8011	P	724-30	8,240	1	1961	1991	C	D	A	Ajax Bachelor Quarters
8012	P	724-30	8,240	1	1961	1991	C	D	A	Ajax Bachelor Quarters
8103	P	724-30	8,240	1	1966	1996	C	F	C	Sprint Bachelor Quarters
8017	P	721-40	6,086	1	1961	1991	C	D	A	Zeus Bachelor Quarters
8114	P	724-30	5,376	2	1971	2001	C	D	C	Nike Bachelor Quarters
8115	P	721-40	9,590	2	1971	2001	C	D	C	Spartan Bachelor Quarters
8004	P	312-20	1,898	1	1961	1991	C	C	C	Payload Assembly Bldg
8015	P	722-90	5,271	1	1961	1991	C	D	A	Dining Hall/Kitchen
8016	P	740-15	7,556	1	1961	1991	C	D	A	Outrigger Club
8023	P	730-10	5,516	1	1961	1991	C	D	C	Fire Station, Roi-Namur
8027	S	442-20	3,024	1	1961	1981	C	N	N	Hobby Shop, Amateur Radio
8035	P	610-50	5,190	1	1961	1991	C	D	C	Administrative Offices, Roi-Namur
	P	131-90	2,650	1	1961	1991	C	D	C	Telephone Operations Support
	P	550-20	700	1	1961	1991	C	D	C	Dispensary, Roi-Namur
	P	610-90	700	1	1961	1991	C	D	C	SLEC Administration, Roi-Namur
	P	141-10	600	1	1961	1991	C	D	C	Air Terminal, Roi-Namur
	P	131-60	550	1	1961	1991	C	D	C	AJN Radio Room (KREMS)
	P	730-73	320	1	1961	1991	C	D	C	Post Office, Roi-Namur
	P	740-06	90	1	1961	1991	C	D	C	Bank of Guam, Roi-Namur
8060	P	312-20	65,860	2	1961	1991	C	S	S	TRADEX Radar/Computer Building
8064	S	218-85	4,500	1	1961	1981	C	N	N	Maintenance Shop
8075	S	740-50	2,200	1	1962	1982	C	S	A	Gimbels Retail Store
8104	P	317-20	3,168	2	1966	1996	C	F	C	Army Optical Station
8110	P	610-60	31,170	1	1967	1997	C	C	C	ALTAIR Admin/Operations Building
8132	P	312-20	5,320	1	1970	2000	C	F	C	Launch operations Control Bldg (LOCB)

BUILDING LISTING FOR ROI-NAMUR

FAC. NUM.	T C	CATEGORY CODE	TOTAL AREA	# FL	YR BUILT	EXT. LIFE	CONSTRUCT MATERIALS FOUN.	WALL	ROOF	CURRENT USE DESCRIPTION/FAC NAME
8140	P	610-60	18,353	1	1968	1998	C	C	C	ALCOR Admin/Operations Bldg
8194	P	390-28	3,796	2	1981	2011	C	C	C	Millimeter Wave Radar Building

SELECTED ECO's
TO BE ANALYZED
MATRIX

(KWAJALEIN)

SELECTED ECOs TO BE ANALYZED

(As a minimum, evaluation should include but not be limited to the ECOs listed)

ADMINISTRATIVE OFFICE	MARINE MAINTAINENCE SHOP	GSK, ETC.	CORLETT RECREATION CTR	JR-SR HIGH SCHOOL	ELEMENTARY SCHOOL	SURFWAY	HOUSING-TRAILERS	BQs	PACIFIC BQs, POST OFC., etc.	FAMILY HOUSING	*ENERGY CONSERVATION OPPORTUNITIES* / *FACILITY TYPES*
✓						✓	✓	✓		✓	INSULATION (WALL, ROOF, PIPE, DUCT, ETC.)
✓				✓	✓	✓	✓	✓	✓	✓	INSULATED GLASS OR DOUBLE GLAZED WINDOWS
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	WEATHER STRIPPING & CAULKING
✓					✓			✓	✓	✓	INSULATED PANELS
✓				✓	✓	✓		✓	✓	✓	SOLAR FILMS
✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	VESTIBULES
						✓					LOAD DOCK SEALS
✓					✓			✓	✓	✓	REDUCTION OF GLASS AREA
											REPLACE KITCHEN LIGHT FIXTURES
								✓	✓	✓	SHUTDOWN ENERGY TO HOT WATER HEATER MODIFY CONTROLS
✓	✓	✓				✓		✓	✓	✓	ENERGY CONSERVING FLUORESCENT LAMPS AND BALLAST
✓											REDUCE LIGHTING LEVELS
✓	✓	✓	✓			✓	✓	✓	✓	✓	REPLACE INCANDESCENT LIGHTING
✓	✓	✓	✓			✓	✓	✓	✓		USE MORE EFFICIENT LIGHTING SOURCE
											IMPROVE POWER FACTOR
						✓					HIGH EFFICIENCY MOTOR REPLACEMENT
✓	✓	✓	✓	✓	✓	✓		✓	✓		NIGHT SETBACK/SETUP THERMOSTATS
											INFRARED HEATERS
											ECONOMIZER CYCLES (DRY BULB)
								✓	✓		CONTROL HOT WATER CIRCULATION PUMPS
											FM RADIO CONTROLS

SELECTED ECOs TO BE ANALYZED

(As a minimum, evaluation should include but not be limited to the ECOs listed)

ENERGY CONSERVATION OPPORTUNITIES	FAMILY HOUSING	PACIFIC BQs, POST OFC., etc.	BQs	HOUSING-TRAILERS	SURFWAY	ELEMENTARY SCHOOL	JR-SR HIGH SCHOOL	CORLETT RECREATION CTR	GSK, ETC.	MARINE MAINTAINENCE SHOP	ADMINISTRATION OFFICE
RADIATOR CONTROLS											
DECENTRALIZE DOMENSTIC HOT WATER HEATERS											
INSTALL SHOWER RESTRICTORS OR LIMITED FLOW SHOWER HEADS (2 TO 3 GPM)	✓	✓	✓								
HEAT RECLAIM FROM HOT REFRIGERANT GAS	✓	✓	✓			✓	✓	✓			✓
REDUCE AIR FLOW											
PREVENT AIR STRATIFICATION						✓					
INSTALL TIME CLOCKS					✓				✓	✓	
BOILER OXYGEN TRIM CONTROL (FIXED OR PORTABLE)											
REVISE BOILER CONTROLS											
CHILLER REPLACEMENT		✓	✓			✓	✓				✓
CHILLER CONTROLS											
REPLACE ABSORBTION CHILLER											
REDUCE STREET LIGHTS											
INSULATE STEAM AND CONDENSATE LINES											
RETURN CONDENSATE											
HEAT RECLAIM FROM FAMILY HOUSING CONDENSER UNITS FOR PREHEATING DOMESTIC HOT WATER				✓		✓	✓				✓
DOMESTIC HOT WATER HEAT PUMPS											
TRANSFORMER OVER VOLTAGE											
TRANSFORMER LOADING											
REVISE OR REPAIR BUILDING BUILDING HVAC CONTROLS				✓	✓	✓	✓	✓	✓	✓	✓
WASTE HEAT RECOVERY											

FACILITY TYPES

SELECTED ECOs TO BE ANALYZED

(As a minimum, evaluation should include but not be limited to the ECOs listed)

ENERGY CONSERVATION OPPORTUNITIES	FAMILY HOUSING	PACIFIC BQs, POST OFC., etc.	BQs	HOUSING-TRAILERS	SURFWAY	ELEMENTARY SCHOOL	JR-SR HIGH SCHOOL	CORLETT RECREATION CTR	GSK, ETC.	MARINE MAINTAINENCE SHOP	ADMINISTRATION OFFICE
THERMAL STORAGE											
STEAM TRAP INSPECTION											
INSTANTANEOUS HOT WATER HEATER											
AIR CURTAINS					✓						
OCCUPANCY SENSORS TO CONTROL LIGHTING OR HVAC		✓	✓		✓	✓	✓	✓	✓	✓	
REFLECTORS FOR FLUORESCENT FIXTURES	✓	✓	✓		✓	✓	✓				
WATER SPRAY ROOF COOLING											
PHOTOCELLS TO CONTROL LIGHTING											
LOW EMISSIVITY WINDOWS	✓	✓	✓	✓	✓	✓	✓				
SEPARATE SWITCHES TO CONTROL LIGHTING ARRANGEMENTS											
CENTRAL AIR CONDITIONING	✓										
BALANCE A/C SYSTEMS		✓	✓			✓	✓		✓		✓
INSTALL REFRIGERATION CASE BARRIERS (STRIP CURTAINS, GLASS DOORS, NIGHT COVERS)					✓						
CONDITION OUTSIDE AIR SEPARATELY TO REDUCE VOLUME OF AIR TO BE CONDITIONED					✓						
CHANGE OUT INEFFICIENT REFRIGERATION DISPLAY CASES TO NEW VERTICAL ENERGY EFFICIENT REFRIGERATED DISPLAY CASES					✓						

SELECTED ECOs TO BE ANALYZED

(As a minimum, evaluation should include but not be limited to the ECOs listed)

ENERGY CONSERVATION OPPORTUNITIES	*FACILITY TYPES*	MACY'S WEST	TEN-TEN	HEAVY EQUIP/GEN REPAIR	LEC FOM MAINT/ADMIN	BOWLING, LIBRARY, ETC.	INSTRUMENTATION CONTROL	AUTOMOTIVE	LEC FOM CARPENTER SHOP	ARTS AND CRAFTS	WEATHER STATION
INSULATION (WALL, ROOF, PIPE, DUCT, ETC.)			✓	✓	✓			✓			
INSULATED GLASS OR DOUBLE GLAZED WINDOWS				✓	✓			✓			
WEATHER STRIPPING & CAULKING		✓	✓	✓		✓	✓	✓	✓	✓	✓
INSULATED PANELS				✓	✓			✓			
SOLAR FILMS					✓						
VESTIBULES		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
LOAD DOCK SEALS											
REDUCTION OF GLASS AREA				✓	✓			✓			
REPLACE KITCHEN LIGHT FIXTURES											
SHUTDOWN ENERGY TO HOT WATER HEATER MODIFY CONTROLS											
ENERGY CONSERVING FLUORESCENT LAMPS AND BALLAST		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
REDUCE LIGHTING LEVELS											
REPLACE INCANDESCENT LIGHTING		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
USE MORE EFFICIENT LIGHTING SOURCE		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
IMPROVE POWER FACTOR											
HIGH EFFICIENCY MOTOR REPLACEMENT											
NIGHT SETBACK/SETUP THERMOSTATS		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
INFRARED HEATERS											
ECONOMIZER CYCLES (DRY BULB)											
CONTROL HOT WATER CIRCULATION PUMPS											
FM RADIO CONTROLS											

SELECTED ECOs TO BE ANALYZED

(As a minimum, evaluation should include but not be limited to the ECOs listed)

WEATHER STATION	ARTS AND CRAFTS	LEC FOM CARPENTER SHOP	AUTOMOTIVE	INSTRUMENTATION CONTROL	BOWLING, LIBRARY, ETC.	LEC FOM MAINT/ADMIN	HEAVY EQUIP/GEN REPAIR	TEN-TEN	MACY'S WEST	*ENERGY CONSERVATION OPPORTUNITIES*
										RADIATOR CONTROLS
										DECENTRALIZE DOMENSTIC HOT WATER HEATERS
										INSTALL SHOWER RESTRICTORS OR LIMITED FLOW SHOWER HEADS (2 TO 3 GPM)
			✓							HEAT RECLAIM FROM HOT REFRIGERANT GAS
										REDUCE AIR FLOW
						✓				PREVENT AIR STRATIFICATION
	✓	✓	✓	✓	✓	✓	✓	✓	✓	INSTALL TIME CLOCKS
										BOILER OXYGEN TRIM CONTROL (FIXED OR PORTABLE)
										REVISE BOILER CONTROLS
	✓				✓			✓	✓	CHILLER REPLACEMENT
										CHILLER CONTROLS
										REPLACE ABSORBTION CHILLER
										REDUCE STREET LIGHTS
										INSULATE STEAM AND CONDENSATE LINES
										RETURN CONDENSATE
			✓							HEAT RECLAIM FROM FAMILY HOUSING CONDENSER UNITS FOR PREHEATING DOMESTIC HOT WATER
										DOMESTIC HOT WATER HEAT PUMPS
										TRANSFORMER OVER VOLTAGE
										TRANSFORMER LOADING
		✓	✓	✓		✓		✓	✓	REVISE OR REPAIR BUILDING BUILDING HVAC CONTROLS
										WASTE HEAT RECOVERY

SELECTED ECOs TO BE ANALYZED

(As a minimum, evaluation should include but not be limited to the ECOs listed)

ENERGY CONSERVATION OPPORTUNITIES	MACY'S WEST	TEN-TEN	HEAVY EQUIP/GEN REPAIR	LEC FOM MAINT/ADMIN	BOWLING, LIBRARY, ETC.	INSTRUMENTATION CONTROL	AUTOMOTIVE	LEC FOM CARPENTER SHOP	ARTS AND CRAFTS	WEATHER STATION
THERMAL STORAGE										
STEAM TRAP INSPECTION										
INSTANTANEOUS HOT WATER HEATER										
AIR CURTAINS		✓								
OCCUPANCY SENSORS TO CONTROL LIGHTING OR HVAC	✓	✓	✓	✓		✓	✓	✓	✓	
REFLECTORS FOR FLUORESCENT FIXTURES	✓	✓	✓	✓	✓	✓	✓	✓	✓	
WATER SPRAY ROOF COOLING										
PHOTOCELLS TO CONTROL LIGHTING										
LOW EMISSIVITY WINDOWS			✓	✓			✓			
SEPARATE SWITCHES TO CONTROL LIGHTING ARRANGEMENTS										
CENTRAL AIR CONDITIONING			✓	✓	✓		✓	✓		
BALANCE A/C SYSTEMS	✓	✓	✓	✓	✓	✓			✓	
INSTALL REFRIGERATION CASE BARRIERS (STRIP CURTAINS, GLASS DOORS, NIGHT COVERS)										
CONDITION OUTSIDE AIR SEPARATELY TO REDUCE VOLUME OF AIR TO BE CONDITIONED										
CHANGE OUT INEFFICIENT REFRIGERATION DISPLAY CASES TO NEW VERTICAL ENERGY EFFICIENT REFRIGERATED DISPLAY CASES										

FACILITY TYPES

SELECTED ECOs TO BE ANALYZED

(As a minimum, evaluation should include but not be limited to the ECOs listed)

COMMUNICATIONS CENTER	PHOTO LAB	RANGE CALIBRATION	VETERAN HALL/SHRINE CLUB	DESALINATION PLANT	FIRE STATION	AIRCRAFT SURVIVAL	TERMINAL	LEC AVIATION, FINANCE	COUNTRY CLUB	WAREHOUSE-TRANSIT CARGO	*ENERGY CONSERVATION OPPORTUNITIES*
	✓	✓	✓				✓	✓	✓		INSULATION (WALL, ROOF, PIPE, DUCT, ETC.)
					✓		✓	✓	✓		INSULATED GLASS OR DOUBLE GLAZED WINDOWS
✓	✓	✓	✓		✓	✓	✓	✓	✓		WEATHER STRIPPING & CAULKING
					✓		✓	✓			INSULATED PANELS
											SOLAR FILMS
✓	✓	✓	✓		✓	✓	✓	✓	✓		VESTIBULES
											LOAD DOCK SEALS
					✓		✓	✓			REDUCTION OF GLASS AREA
											REPLACE KITCHEN LIGHT FIXTURES
											SHUTDOWN ENERGY TO HOT WATER HEATER MODIFY CONTROLS
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	ENERGY CONSERVING FLUORESCENT LAMPS AND BALLAST
					✓	✓	✓	✓	✓	✓	REDUCE LIGHTING LEVELS
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	REPLACE INCANDESCENT LIGHTING
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	USE MORE EFFICIENT LIGHTING SOURCE
											IMPROVE POWER FACTOR
											HIGH EFFICIENCY MOTOR REPLACEMENT
✓	✓	✓	✓		✓		✓	✓	✓		NIGHT SETBACK/SETUP THERMOSTATS
											INFRARED HEATERS
											ECONOMIZER CYCLES (DRY BULB)
											CONTROL HOT WATER CIRCULATION PUMPS
											FM RADIO CONTROLS

SELECTED ECOs TO BE ANALYZED

(As a minimum, evaluation should include but not be limited to the ECOs listed)

COMMUNICATIONS CENTER	PHOTO LAB	RANGE CALIBRATION	VETERAN HALL/SHRINE CLUB	DESALINATION PLANT	FIRE STATION	AIRCRAFT SURVIVAL	TERMINAL	LEC AVIATION, FINANCE	COUNTRY CLUB	WAREHOUSE-TRANSIT CARGO	*ENERGY CONSERVATION OPPORTUNITIES*
											RADIATOR CONTROLS
											DECENTRALIZE DOMENSTIC HOT WATER HEATERS
					✓						INSTALL SHOWER RESTRICTORS OR LIMITED FLOW SHOWER HEADS (2 TO 3 GPM)
✓	✓		✓		✓		✓	✓	✓		HEAT RECLAIM FROM HOT REFRIGERANT GAS
											REDUCE AIR FLOW
											PREVENT AIR STRATIFICATION
✓	✓	✓	✓		✓	✓	✓	✓		✓	INSTALL TIME CLOCKS
											BOILER OXYGEN TRIM CONTROL (FIXED OR PORTABLE)
											REVISE BOILER CONTROLS
	✓	✓	✓		✓		✓				CHILLER REPLACEMENT
											CHILLER CONTROLS
											REPLACE ABSORBTION CHILLER
											REDUCE STREET LIGHTS
											INSULATE STEAM AND CONDENSATE LINES
											RETURN CONDENSATE
✓	✓	✓	✓		✓		✓	✓	✓		HEAT RECLAIM FROM FAMILY HOUSING CONDENSER UNITS FOR PREHEATING DOMESTIC HOT WATER
											DOMESTIC HOT WATER HEAT PUMPS
											TRANSFORMER OVER VOLTAGE
											TRANSFORMER LOADING
	✓	✓	✓				✓	✓	✓		REVISE OR REPAIR BUILDING BUILDING HVAC CONTROLS
											WASTE HEAT RECOVERY

SELECTED ECOs TO BE ANALYZED

(As a minimum, evaluation should include but not be limited to the ECOs listed)

ENERGY CONSERVATION OPPORTUNITIES	*FACILITY TYPES*										
	WAREHOUSE-TRANSIT CARGO	COUNTRY CLUB	LEC AVIATION, FINANCE	TERMINAL	AIRCRAFT SURVIVAL	FIRE STATION	DESALINATION PLANT	VETERAN HALL/SHRINE CLUB	RANGE CALIBRATION	PHOTO LAB	COMMUNICATIONS CENTER
THERMAL STORAGE											
STEAM TRAP INSPECTION											
INSTANTANEOUS HOT WATER HEATER											
AIR CURTAINS											
OCCUPANCY SENSORS TO CONTROL LIGHTING OR HVAC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
REFLECTORS FOR FLUORESCENT FIXTURES	✓	✓	✓	✓	✓	✓				✓	
WATER SPRAY ROOF COOLING											
PHOTOCELLS TO CONTROL LIGHTING											
LOW EMISSIVITY WINDOWS	✓	✓	✓	✓		✓					
SEPARATE SWITCHES TO CONTROL LIGHTING ARRANGEMENTS											
CENTRAL AIR CONDITIONING				✓		✓					
BALANCE A/C SYSTEMS			✓	✓		✓		✓	✓	✓	✓
INSTALL REFRIGERATION CASE BARRIERS (STRIP CURTAINS, GLASS DOORS, NIGHT COVERS)											
CONDITION OUTSIDE AIR SEPARATELY TO REDUCE VOLUME OF AIR TO BE CONDITIONED											
CHANGE OUT INEFFICIENT REFRIGERATION DISPLAY CASES TO NEW VERTICAL ENERGY EFFICIENT REFRIGERATED DISPLAY CASES											

SELECTED ECOs TO BE ANALYZED

(As a minimum, evaluation should include but not be limited to the ECOs listed)

TACAN BUILDING W/EMER GENERATOR	TASA FACILITY	SEWAGE TREATMENT PLANT	FPO 19 RADAR	LEC SUPPLY BULK STORAGE	CE TESTING LAB	FIRE PREVENT OFFICE/EQUIP MAINTENANCE	HF TRASMITTER BLDG	RANGE SAFETY CENTER	RANGE COMMAND	RANGE OPERATIONS BLDG	*FACILITY TYPES* / *ENERGY CONSERVATION OPPORTUNITIES*
		✓									INSULATION (WALL, ROOF, PIPE, DUCT, ETC.)
		✓							✓	✓	INSULATED GLASS OR DOUBLE GLAZED WINDOWS
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	WEATHER STRIPPING & CAULKING
									✓		INSULATED PANELS
											SOLAR FILMS
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	VESTIBULES
											LOAD DOCK SEALS
									✓		REDUCTION OF GLASS AREA
											REPLACE KITCHEN LIGHT FIXTURES
											SHUTDOWN ENERGY TO HOT WATER HEATER MODIFY CONTROLS
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	ENERGY CONSERVING FLUORESCENT LAMPS AND BALLAST
									✓		REDUCE LIGHTING LEVELS
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	REPLACE INCANDESCENT LIGHTING
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	USE MORE EFFICIENT LIGHTING SOURCE
											IMPROVE POWER FACTOR
											HIGH EFFICIENCY MOTOR REPLACEMENT
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NIGHT SETBACK/SETUP THERMOSTATS
											INFRARED HEATERS
											ECONOMIZER CYCLES (DRY BULB)
											CONTROL HOT WATER CIRCULATION PUMPS
											FM RADIO CONTROLS

SELECTED ECOs TO BE ANALYZED

(As a minimum, evaluation should include but not be limited to the ECOs listed)

TACAN BUILDING W/EMER GENERATOR	TASA FACILITY	SEWAGE TREATMENT PLANT	FPO 19 RADAR	LEC SUPPLY BULK STORAGE	CE TESTING LAB	FIRE PREVENT OFFICE/EQUIP MAINTENANCE	HF TRASMITTER BLDG	RANGE SAFETY CENTER	RANGE COMMAND	RANGE OPERATIONS BLDG	*ENERGY CONSERVATION OPPORTUNITIES*
											RADIATOR CONTROLS
											DECENTRALIZE DOMENSTIC HOT WATER HEATERS
											INSTALL SHOWER RESTRICTORS OR LIMITED FLOW SHOWER HEADS (2 TO 3 GPM)
		✓				✓			✓	✓	HEAT RECLAIM FROM HOT REFRIGERANT GAS
											REDUCE AIR FLOW
							✓	✓			PREVENT AIR STRATIFICATION
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	INSTALL TIME CLOCKS
											BOILER OXYGEN TRIM CONTROL (FIXED OR PORTABLE)
											REVISE BOILER CONTROLS
							✓	✓	✓		CHILLER REPLACEMENT
											CHILLER CONTROLS
											REPLACE ABSORBTION CHILLER
											REDUCE STREET LIGHTS
											INSULATE STEAM AND CONDENSATE LINES
											RETURN CONDENSATE
							✓		✓	✓	HEAT RECLAIM FROM FAMILY HOUSING CONDENSER UNITS FOR PREHEATING DOMESTIC HOT WATER
											DOMESTIC HOT WATER HEAT PUMPS
											TRANSFORMER OVER VOLTAGE
											TRANSFORMER LOADING
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	REVISE OR REPAIR BUILDING BUILDING HVAC CONTROLS
											WASTE HEAT RECOVERY

SELECTED ECOs TO BE ANALYZED

(As a minimum, evaluation should include but not be limited to the ECOs listed)

ENERGY CONSERVATION OPPORTUNITIES	RANGE OPERATIONS BLDG	RANGE COMMAND	RANGE SAFETY CENTER	HF TRASMITTER BLDG	FIRE PREVENT OFFICE/EQUIP MAINTENANCE	CE TESTING LAB	LEC SUPPLY BULK STORAGE	FPO 19 RADAR	SEWAGE TREATMENT PLANT	TASA FACILITY	TACAN BUILDING W/EMER GENERATOR
FACILITY TYPES											
THERMAL STORAGE											
STEAM TRAP INSPECTION											
INSTANTANEOUS HOT WATER HEATER											
AIR CURTAINS											
OCCUPANCY SENSORS TO CONTROL LIGHTING OR HVAC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
REFLECTORS FOR FLUORESCENT FIXTURES	✓	✓	✓								
WATER SPRAY ROOF COOLING											
PHOTOCELLS TO CONTROL LIGHTING											
LOW EMISSIVITY WINDOWS	✓	✓							✓		
SEPARATE SWITCHES TO CONTROL LIGHTING ARRANGEMENTS											
CENTRAL AIR CONDITIONING					✓						
BALANCE A/C SYSTEMS	✓	✓	✓	✓		✓		✓	✓	✓	
INSTALL REFRIGERATION CASE BARRIERS (STRIP CURTAINS, GLASS DOORS, NIGHT COVERS)											
CONDITION OUTSIDE AIR SEPARATELY TO REDUCE VOLUME OF AIR TO BE CONDITIONED											
CHANGE OUT INEFFICIENT REFRIGERATION DISPLAY CASES TO NEW VERTICAL ENERGY EFFICIENT REFRIGERATED DISPLAY CASES											

SELECTED ECOs TO BE ANALYZED

(As a minimum, evaluation should include but not be limited to the ECOs listed)

LEC HUMAN RESOURCES	LEC WORK CONTROL BLDG	IVEY HALL COMMUNITY BLDG	*ENERGY CONSERVATION OPPORTUNITIES*
✓	✓	✓	INSULATION (WALL, ROOF, PIPE, DUCT, ETC.)
			INSULATED GLASS OR DOUBLE GLAZED WINDOWS
✓	✓	✓	WEATHER STRIPPING & CAULKING
			INSULATED PANELS
			SOLAR FILMS
✓	✓	✓	VESTIBULES
			LOAD DOCK SEALS
			REDUCTION OF GLASS AREA
			REPLACE KITCHEN LIGHT FIXTURES
			SHUTDOWN ENERGY TO HOT WATER HEATER MODIFY CONTROLS
✓	✓	✓	ENERGY CONSERVING FLUORESCENT LAMPS AND BALLAST
			REDUCE LIGHTING LEVELS
	✓	✓	REPLACE INCANDESCENT LIGHTING
✓	✓	✓	USE MORE EFFICIENT LIGHTING SOURCE
			IMPROVE POWER FACTOR
			HIGH EFFICIENCY MOTOR REPLACEMENT
✓	✓	✓	NIGHT SETBACK/SETUP THERMOSTATS
			INFRARED HEATERS
			ECONOMIZER CYCLES (DRY BULB)
			CONTROL HOT WATER CIRCULATION PUMPS
			FM RADIO CONTROLS

SELECTED ECOs TO BE ANALYZED

(As a minimum, evaluation should include but not be limited to the ECOs listed)

ENERGY CONSERVATION OPPORTUNITIES	*FACILITY TYPES* IVEY HALL COMMUNITY BLDG	LEC WORK CONTROL BLDG	LEC HUMAN RESOURCES
RADIATOR CONTROLS			
DECENTRALIZE DOMENSTIC HOT WATER HEATERS	✓		
INSTALL SHOWER RESTRICTORS OR LIMITED FLOW SHOWER HEADS (2 TO 3 GPM)			
HEAT RECLAIM FROM HOT REFRIGERANT GAS	✓		
REDUCE AIR FLOW			
PREVENT AIR STRATIFICATION			
INSTALL TIME CLOCKS	✓	✓	✓
BOILER OXYGEN TRIM CONTROL (FIXED OR PORTABLE)			
REVISE BOILER CONTROLS			
CHILLER REPLACEMENT			
CHILLER CONTROLS			
REPLACE ABSORBTION CHILLER			
REDUCE STREET LIGHTS			
INSULATE STEAM AND CONDENSATE LINES			
RETURN CONDENSATE			
HEAT RECLAIM FROM FAMILY HOUSING CONDENSER UNITS FOR PREHEATING DOMESTIC HOT WATER	✓		
DOMESTIC HOT WATER HEAT PUMPS			
TRANSFORMER OVER VOLTAGE			
TRANSFORMER LOADING			
REVISE OR REPAIR BUILDING BUILDING HVAC CONTROLS	✓	✓	✓
WASTE HEAT RECOVERY			

SELECTED ECOs TO BE ANALYZED

(As a minimum, evaluation should include but not be limited to the ECOs listed)

ENERGY CONSERVATION OPPORTUNITIES	*FACILITY TYPES*		
	IVEY HALL COMMUNITY BLDG	LEC WORK CONTROL BLDG	LEC HUMAN RESOURCES
THERMAL STORAGE			
STEAM TRAP INSPECTION			
INSTANTANEOUS HOT WATER HEATER			
AIR CURTAINS			
OCCUPANCY SENSORS TO CONTROL LIGHTING OR HVAC	✓	✓	✓
REFLECTORS FOR FLUORESCENT FIXTURES			
WATER SPRAY ROOF COOLING			
PHOTOCELLS TO CONTROL LIGHTING			
LOW EMISSIVITY WINDOWS			
SEPARATE SWITCHES TO CONTROL LIGHTING ARRANGEMENTS			
CENTRAL AIR CONDITIONING			
BALANCE A/C SYSTEMS	✓	✓	
INSTALL REFRIGERATION CASE BARRIERS (STRIP CURTAINS, GLASS DOORS, NIGHT COVERS)			
CONDITION OUTSIDE AIR SEPARATELY TO REDUCE VOLUME OF AIR TO BE CONDITIONED			
CHANGE OUT INEFFICIENT REFRIGERATION DISPLAY CASES TO NEW VERTICAL ENERGY EFFICIENT REFRIGERATED DISPLAY CASES			

SELECTED ECO's TO BE ANALYZED MATRIX

(ROI-NAMUR)

SELECTED ECOs TO BE ANALYZED

(As a minimum, evaluation should include but not be limited to the ECOs listed)

LAUNCH OPER CONTROL BLDG	ALTAIR ADMIN/OPERATIONS BLDG	ARMY OPTICAL STATION	GIMBELS	MAINTENANCE SHOP	TRADEX RADAR/COMPUTER BLDG	LEC ADMIN OFFICES, ETC.	HOBBY SHOP, AMATEUR SHOP	FIRE STATION	PAYLOAD ASSEMBLY	BQ's	*ENERGY CONSERVATION OPPORTUNITIES*
	✓	✓	✓		✓	✓	✓	✓	✓	✓	INSULATION (WALL, ROOF, PIPE, DUCT, ETC.)
						✓		✓		✓	INSULATED GLASS OR DOUBLE GLAZED WINDOWS
✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	WEATHER STRIPPING & CAULKING
						✓				✓	INSULATED PANELS
								✓		✓	SOLAR FILMS
✓	✓	✓	✓		✓	✓		✓	✓	✓	VESTIBULES
											LOAD DOCK SEALS
						✓				✓	REDUCTION OF GLASS AREA
											REPLACE KITCHEN LIGHT FIXTURES
											SHUTDOWN ENERGY TO HOT WATER HEATER MODIFY CONTROLS
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	ENERGY CONSERVING FLUORESCENT LAMPS AND BALLAST
✓											REDUCE LIGHTING LEVELS
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	REPLACE INCANDESCENT LIGHTING
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	USE MORE EFFICIENT LIGHTING SOURCE
											IMPROVE POWER FACTOR
								✓	✓	✓	HIGH EFFICIENCY MOTOR REPLACEMENT
✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	NIGHT SETBACK/SETUP THERMOSTATS
											INFRARED HEATERS
											ECONOMIZER CYCLES (DRY BULB)
										✓	CONTROL HOT WATER CIRCULATION PUMPS
											FM RADIO CONTROLS

SELECTED ECOs TO BE ANALYZED

(As a minimum, evaluation should include but not be limited to the ECOs listed)

ENERGY CONSERVATION OPPORTUNITIES	BQ's	PAYLOAD ASSEMBLY	FIRE STATION	HOBBY SHOP, AMATEUR SHOP	LEC ADMIN OFFICES, ETC.	TRADEX RADAR/COMPUTER BLDG	MAINTENANCE SHOP	GIMBELS	ARMY OPTICAL STATION	ALTAIR ADMIN/OPERATIONS BLDG	LAUNCH OPERATION CONTROL BLDG
RADIATOR CONTROLS											
DECENTRALIZE DOMENSTIC HOT WATER HEATERS											
INSTALL SHOWER RESTRICTORS OR LIMITED FLOW SHOWER HEADS (2 TO 3 GPM)	✓		✓								
HEAT RECLAIM FROM HOT REFRIGERANT GAS	✓		✓		✓	✓					
REDUCE AIR FLOW											
PREVENT AIR STRATIFICATION											
INSTALL TIME CLOCKS	✓	✓			✓	✓	✓	✓	✓	✓	✓
BOILER OXYGEN TRIM CONTROL (FIXED OR PORTABLE)											
REVISE BOILER CONTROLS											
CHILLER REPLACEMENT	✓	✓									
CHILLER CONTROLS											
REPLACE ABSORBTION CHILLER											
REDUCE STREET LIGHTS											
INSULATE STEAM AND CONDENSATE LINES											
RETURN CONDENSATE											
HEAT RECLAIM FROM FAMILY HOUSING CONDENSER UNITS FOR PREHEATING DOMESTIC HOT WATER	✓		✓			✓					
DOMESTIC HOT WATER HEAT PUMPS											
TRANSFORMER OVER VOLTAGE											
TRANSFORMER LOADING											
REVISE OR REPAIR BUILDING BUILDING HVAC CONTROLS	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
WASTE HEAT RECOVERY											

SELECTED ECOs TO BE ANALYZED

(As a minimum, evaluation should include but not be limited to the ECOs listed)

ENERGY CONSERVATION OPPORTUNITIES	BQ's	PAYLOAD ASSEMBLY	FIRE STATION	HOBBY SHOP, AMATEUR SHOP	LEC ADMIN OFFICES, ETC.	TRADEX RADAR/COMPUTER BLDG	MAINTENANCE SHOP	GIMBELS	ARMY OPTICAL STATION	ALTAIR ADMIN/OPERATIONS BLDG	LAUNCH OPER CONTROL BLDG
THERMAL STORAGE											
STEAM TRAP INSPECTION											
INSTANTANEOUS HOT WATER HEATER											
AIR CURTAINS											
OCCUPANCY SENSORS TO CONTROL LIGHTING OR HVAC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
REFLECTORS FOR FLUORESCENT FIXTURES	✓	✓	✓		✓						
WATER SPRAY ROOF COOLING											
PHOTOCELLS TO CONTROL LIGHTING											
LOW EMISSIVITY WINDOWS	✓		✓		✓						
SEPARATE SWITCHES TO CONTROL LIGHTING ARRANGEMENTS											
CENTRAL AIR CONDITIONING				✓							
BALANCE A/C SYSTEMS	✓	✓	✓		✓	✓		✓	✓	✓	✓
INSTALL REFRIGERATION CASE BARRIERS (STRIP CURTAINS, GLASS DOORS, NIGHT COVERS)											
CONDITION OUTSIDE AIR SEPARATELY TO REDUCE VOLUME OF AIR TO BE CONDITIONED											
CHANGE OUT INEFFICIENT REFRIGERATION DISPLAY CASES TO NEW VERTICAL ENERGY EFFICIENT REFRIGERATED DISPLAY CASES											

SELECTED ECOs TO BE ANALYZED

(As a minimum, evaluation should include but not be limited to the ECOs listed)

ENERGY CONSERVATION OPPORTUNITIES	*FACILITY TYPES*	ALCOR ADMIN/OPERATIONS BLDG	MILLIMETER WAVE RADAR BLDG
INSULATION (WALL, ROOF, PIPE, DUCT, ETC.)			
INSULATED GLASS OR DOUBLE GLAZED WINDOWS			
WEATHER STRIPPING & CAULKING		✓	✓
INSULATED PANELS			
SOLAR FILMS			
VESTIBULES		✓	✓
LOAD DOCK SEALS			
REDUCTION OF GLASS AREA			
REPLACE KITCHEN LIGHT FIXTURES			
SHUTDOWN ENERGY TO HOT WATER HEATER MODIFY CONTROLS			
ENERGY CONSERVING FLUORESCENT LAMPS AND BALLAST		✓	✓
REDUCE LIGHTING LEVELS		✓	✓
REPLACE INCANDESCENT LIGHTING		✓	✓
USE MORE EFFICIENT LIGHTING SOURCE		✓	✓
IMPROVE POWER FACTOR			
HIGH EFFICIENCY MOTOR REPLACEMENT			
NIGHT SETBACK/SETUP THERMOSTATS		✓	✓
INFRARED HEATERS			
ECONOMIZER CYCLES (DRY BULB)			
CONTROL HOT WATER CIRCULATION PUMPS			
FM RADIO CONTROLS			

SELECTED ECOs TO BE ANALYZED

(As a minimum, evaluation should include but not be limited to the ECOs listed)

MILLIMETER WAVE RADAR BLDG	ALCOR ADMIN/OPERATIONS BLDG	*ENERGY CONSERVATION OPPORTUNITIES*
		RADIATOR CONTROLS
		DECENTRALIZE DOMENSTIC HOT WATER HEATERS
		INSTALL SHOWER RESTRICTORS OR LIMITED FLOW SHOWER HEADS (2 TO 3 GPM)
		HEAT RECLAIM FROM HOT REFRIGERANT GAS
		REDUCE AIR FLOW
		PREVENT AIR STRATIFICATION
✓	✓	INSTALL TIME CLOCKS
		BOILER OXYGEN TRIM CONTROL (FIXED OR PORTABLE)
		REVISE BOILER CONTROLS
		CHILLER REPLACEMENT
		CHILLER CONTROLS
		REPLACE ABSORBTION CHILLER
		REDUCE STREET LIGHTS
		INSULATE STEAM AND CONDENSATE LINES
		RETURN CONDENSATE
		HEAT RECLAIM FROM FAMILY HOUSING CONDENSER UNITS FOR PREHEATING DOMESTIC HOT WATER
		DOMESTIC HOT WATER HEAT PUMPS
		TRANSFORMER OVER VOLTAGE
		TRANSFORMER LOADING
✓	✓	REVISE OR REPAIR BUILDING BUILDING HVAC CONTROLS
		WASTE HEAT RECOVERY

SELECTED ECOs TO BE ANALYZED

(As a minimum, evaluation should include but not be limited to the ECOs listed)

ENERGY CONSERVATION OPPORTUNITIES	*FACILITY TYPES* ALCOR ADMIN/OPERATIONS BLDG	MILLIMETER WAVE RADAR BLDG
THERMAL STORAGE		
STEAM TRAP INSPECTION		
INSTANTANEOUS HOT WATER HEATER		
AIR CURTAINS		
OCCUPANCY SENSORS TO CONTROL LIGHTING OR HVAC	✓	✓
REFLECTORS FOR FLUORESCENT FIXTURES		
WATER SPRAY ROOF COOLING		
PHOTOCELLS TO CONTROL LIGHTING		
LOW EMISSIVITY WINDOWS		
SEPARATE SWITCHES TO CONTROL LIGHTING ARRANGEMENTS		
CENTRAL AIR CONDITIONING		
BALANCE A/C SYSTEMS	✓	✓
INSTALL REFRIGERATION CASE BARRIERS (STRIP CURTAINS, GLASS DOORS, NIGHT COVERS)		
CONDITION OUTSIDE AIR SEPARATELY TO REDUCE VOLUME OF AIR TO BE CONDITIONED		
CHANGE OUT INEFFICIENT REFRIGERATION DISPLAY CASES TO NEW VERTICAL ENERGY EFFICIENT REFRIGERATED DISPLAY CASES		

SELECTED ECO's
TO BE ANALYZED
MATRIX

(SPECIALIZED FACILITIES: KWAJALEIN & ROI-NAMUR)

SELECTED ECOs TO BE ANALYZED

(As a minimum, evaluation should include but not be limited to the ECOs listed)

POWER PLANT 2 (KWAJ)	POWER FACILITIES	*ENERGY CONSERVATION OPPORTUNITIES*
		CONTROLS TO ENSURE PROPER COMBUSTION AIR-FUEL RATIO
		FEEDWATER TREATMENT
		WASTE HEAT RECOVERY, i.e., EXHAUST GASES, PROCESS STEAM, PRESSURE DROP, AND STEAM CONDENSATE AND BLOWDOWN
		IINSTALLATION OF NEW BURNER EQUIPMENT
		REDUCE AIR EXCESS
		LOADING CHARACTERISTICS AND SCHEDULING VERSUS EQUIPMENT CAPACITY (EQUIPMENT OPTIMIZATION)
		STEAM PRESSURE OR HOT WATER TEMPERATURE REDUCTIONS BASED ON SEASONAL LOADING AND/OR EXISTING AND PROJECTED REQUIREMENTS
		REDUCTION IN MAKEUP WATER QUANTITIES
		EVALUATION OF ELECTRIC VERSUS ABSORBTION CHILLERS FOR REPLACEMENT
		USE OF HEAVY OILS FOR THOSE PLANTS WITH LIGHT OIL BURNERS
		BLOWDOWN CONTROL
		COMMON MANFOLDING OF CHILLERS
		PREVENT AIR LEAKAGE
		CONDENSER/COOLING TOWER WATER TREATMENT
		VARIABLE TWO SPEED COOLING TOWER FAN
		FREE COOLING CYCLES IN LIEU OF CHILLER OPERATION
		STORAGE OF CHILLED WATER
		HIGH EFFICIENCY MOTORS
		STEAM DRIVEN AUXILIARIES VERSUS ELECTRICAL DRIVES
		VARIABLE SPEED INDUCED DRAFT FANS AND FORCED DRAFT BLOWERS
✓		INSTRUMENTS AND CONTROLS TO FACILITATE EFFICIENT OPERATIONS

SELECTED ECOs TO BE ANALYZED

(As a minimum, evaluation should include but not be limited to the ECOs listed)

POWER PLANT 2 (KWAJ)	POWER FACILITIES	*ENERGY CONSERVATION OPPORTUNITIES*
		CONVERT STEAM TURBINES TO ELECTRIC MOTORS
✓		VARIABLE VOLUME PUMPING
		USE SMALLER BOILERS WHERE LOAD HAS BEEN REDUCED
		AUTOMATIC CONDENSER AND CHILLER TUBE CLEANERS
		CORRECT SIZING TRAPS
		REPLACE INEFFICIENT BOILERS WITH MORE EFFICIENT BOILERS
		REPLACE INEFFICIENT CHILLERS WITH MORE EFFICIENT CHILLERS
		OCCUPANCY SENSORS TO CONTROL LIGHTING
		PHOTOCELLS TO CONTROL LIGHTING
		SEPARATE SWITCHES TO CONTROL LIGHTING ARRANGEMENTS
✓		MORE EFFICIENT LIGHTING

SELECTED ECOs TO BE ANALYZED

(As a minimum, evaluation should include but not be limited to the ECOs listed)

		SNACK BAR (BLDG 704 - KWAJ)		OUTRIGGER CLUB (ROI-NAMUR)		DINING HALL (ROI-NAMUR)		PACIFIC DINING ROOM (KWAJ)		YOKWE-YUK (KWAJ)	*DINING FACILITIES*
											ENERGY CONSERVATION OPPORTUNITIES
				✓		✓		✓		✓	INSULATION (WALL, ROOF, PIPE, DUCT, ETC.)
				✓		✓		✓		✓	INSULATED GLASS OR DOUBLE GLAZED WINDOWS
		✓		✓		✓		✓		✓	WEATHER STRIPPING & CAULKING
						✓		✓			INSULATED PANELS
											SOLAR FILMS
				✓		✓		✓		✓	VESTIBULES
						✓		✓		✓	REDUCTION OF GLASS AREA
											SHUTDOWN ENERGY TO HOT WATER HEATER MODIFY CONTROLS
											ENERGY CONSERVING FLUORESCENT LAMPS AND BALLAST
											REDUCE LIGHTING LEVELS
		✓		✓		✓		✓		✓	REPLACE INCANDESCENT LIGHTING
		✓		✓		✓		✓		✓	NIGHT SETBACK/SETUP THERMOSTATS
		✓		✓		✓		✓		✓	USE MORE EFFICIENT LIGHTING SOURCES
											ECONOMIZER CYCLES (DRY BULB)
		✓		✓		✓		✓		✓	HEAT RECLAIM FROM KITCHEN EXHAUST
		✓		✓		✓		✓		✓	HEAT RECOVERY FROM DISHWASHER HOT WATER
		✓		✓		✓		✓		✓	BOOSTER HEATERS AT MAJOR HOT WATER USERS
		✓		✓		✓		✓		✓	LOWER DOMESTIC HOT WATER TEMPERATURES
		✓		✓		✓		✓		✓	UPGRADE HVAC CONTROLS
		✓		✓		✓		✓		✓	MAKE HVAC OPERATIONS MORE EFFICIENT
		✓		✓		✓		✓		✓	OPTIMIZE DINING FACILITIES OPERATION

SELECTED ECOs TO BE ANALYZED

(As a minimum, evaluation should include but not be limited to the ECOs listed)

SNACK BAR (BLDG 704 - KWAJ)	OUTRIGGER CLUB (ROI-NAMUR)	DINING HALL (ROI-NAMUR)	PACIFIC DINING ROOM (KWAJ)	YOKWE-YUK (KWAJ)	*DINING FACILITIES* *ENERGY CONSERVATION OPPORTUNITIES*
✓	✓	✓	✓	✓	BALANCE HVAC SYSTEMS
✓	✓	✓	✓	✓	CHANGE TO SERIES FAN POWERED SYSTEM
✓	✓	✓	✓	✓	USE AIR CURTAINS/PLASTIC STRIPS AT PERSONNEL ENTRANCES
✓	✓	✓	✓	✓	INSTALL MAKE UP AIR SUPPLY FOR KITCHEN AREA
✓	✓	✓	✓	✓	SHUT OFF RANGE HOOD EXHAUSE WHENEVER POSSIBLE
					USE OF HEAT PUMP TO HEAT DOMESTIC HOT WATER AND COOL DINING AREA
					WASTE HEAT RECOVERY
					THERMAL STORAGE
					STEAM TRAP INSPECTION
					INSTANTANEOUS HOT WATER HEATERS
			✓		CENTRAL A/C SYSTEM
✓	✓	✓	✓	✓	CONVERT TO ENERGY EFFICIENT/SMALLER MOTORS
					REFLECTORS FOR FLUORESCENT FIXTURES
					OCCUPANCY SENSORS (LIGHTING AND HVAC)
✓	✓	✓	✓	✓	REPLACE EXHAUST HOODS WITH ENERGY EFFICIENT MODELS
					PHOTO CELLS FOR LIGHTING
					TIMERS FOR LIGHTING
	✓	✓	✓	✓	LOW EMISSIVITY WINDOWS
					WATER SPRAY ROOF COOLING
					SEPARATE SWITCHES TO CONTROL LIGHTING ARRANGEMENTS
			✓		INSULATE STEAM LINES

SELECTED ECOs TO BE ANALYZED

(As a minimum, evaluation should include but not be limited to the ECOs listed)

LAUNDRY (KWAJ)	LAUNDRY FACILITIES	*ENERGY CONSERVATION OPPORTUNITIES*
		MAKE HVAC OPERATIONS MORE EFFICIENT
✓		STEAM TRAPS (SIZE, OPERATION, TYPE)
✓		OPTIMIZE LAUNDRY FACILITIES OPERATION (SPACE UTILIZATION, MORE EFFICIENT EQUIPMENT-OPERATION PROCEDURES)
		BALANCE HVAC SYSTEM
		DRYERS EQUIPPED W/TEMPERATURE SENSOR LOCATED ON DISCHARGE DUCT. SENSOR TO PROVIDE INFO TO STOP HEATING DURING DRYING CYCLE AT MOST ENERGY EFFICIENT POINT
		RECYCLING OF RINSE WATER FOR A FOLLOWING WASH CYCLE
✓		EQUIPPING DRYER EXHAUST WITH HEAT EXCHANGER FOR PREHEATING INCOMING AIR TO DRYER
✓		VERIFY THAT SUPPLY STEAM AND CONDENSATE FUNCTIONING IN THE MOST EFFICIENT MANNER
		UTILIZATION OF HIGH TEMPERATURE, OIL HEATED PROCESSES RATHER THAN STEAM
		USE OF HEAT PUMP FOR DOMESTIC HOT WATER HEATING AND FACILITY COOLING
✓		USE OF COLD WATER FOR LAUNDERING
		WASTE HEAT RECOVERY
		EFFICIENCY OF COMPRESSED AIR SYSTEM
		THERMAL STORAGE
✓		SHUT OFF STEAM SUPPLY DURING NON USE HOURS
✓		CORRECT SIZING OF CONDENSATE LINE
		REFLECTORS FOR FLUORESCENT FIXTURES
		OCCUPANCY SENSORS TO CONTROL LIGHTING OR HVAC
		SEPARATE SWITCHES TO CONTROL LIGHTING ARRANGEMENTS

SELECTED ECOs TO BE ANALYZED

(As a minimum, evaluation should include but not be limited to the ECOs listed)

LAUNDRY (KWAJ)	LAUNDRY FACILITIES	*ENERGY CONSERVATION OPPORTUNITIES*
		INSULATION (WALL, ROOF, PIPE, DUCT, ETC.)
		INSULATED GLASS OR DOUBLE GLAZED WINDOWS
		WEATHER STRIPPING & CAULKING
		INSULATED PANELS
		SOLAR FILMS
		VESTIBULES
		REDUCTION OF GLASS AREA
		SHUTDOWN ENERGY TO HOT WATER HEATER MODIFY CONTROLS
✓		ENERGY CONSERVING FLUORESCENT LAMPS AND BALLAST
		REDUCE LIGHTING LEVELS
✓		REPLACE INCANDESCENT LIGHTING
✓		USE MORE EFFICIENT LIGHTING SOURCE
		NIGHT SETBACK THERMOSTATS
		INFRARED HEATERS
		ECONOMIZER CYCLES (DRY BULB)
✓		HEAT RECOVERY FROM LAUNDRY EQUIPMENT
✓		HEAT DESTRATIFICATION
✓		HEAT RECOVERY FROM LAUNDRY WASH WATER
✓		BOOSTER HEATERS AT MAJOR HOT WATER USERS
✓		LOWER DOMESTIC HOT WATER TEMPERATURE
		UPGRADE HVAC CONTROLS

SELECTED ECOs TO BE ANALYZED

(As a minimum, evaluation should include but not be limited to the ECOs listed)

HOSPITAL(KWAJ)	HOSPITAL FACILITIES	*ENERGY CONSERVATION OPPORTUNITIES*
✓		INSULATION (WALL, ROOF, PIPE, DUCT, ETC.)
✓		INSULATED GLASS OR DOUBLE GLAZED WINDOWS
✓		WEATHER STRIPPING & CAULKING
✓		INSULATED PANELS
✓		SOLAR FILMS
		VESTIBULES
✓		LOAD DOCK SEALS
✓		REDUCTION OF GLASS AREA
		REPLACE KITCHEN LIGHT FIXTURES
		SHUTDOWN ENERGY TO HOT WATER HEATER MODIFY CONTROLS
✓		ENERGY CONSERVING FLUORESCENT LAMPS AND BALLAST
		REDUCE LIGHTING LEVELS
✓		REPLACE INCANDESCENT LIGHTING
✓		USE MORE EFFICIENT LIGHTING SOURCE
		IMPROVE POWER FACTOR
		HIGH EFFICIENCY MOTOR REPLACEMENT
✓		NIGHT SETBACK/SETUP THERMOSTATS
		INFRARED HEATERS
		ECONOMIZER CYCLES (DRY BULB)
✓		CONTROL HOT WATER CIRCULATION PUMPS
		FM RADIO CONTROLS

SELECTED ECOs TO BE ANALYZED

(As a minimum, evaluation should include but not be limited to the ECOs listed)

HOSPITAL FACILITIES	HOSPITAL(KWAJ)	ENERGY CONSERVATION OPPORTUNITIES
		RADIATOR CONTROLS
	✓	DECENTRALIZE DOMENSTIC HOT WATER HEATERS
		INSTALL SHOWER RESTRICTORS OR LIMITED FLOW SHOWER HEADS (2 TO 3 GPM)
	✓	HEAT RECLAIM FROM HOT REFRIGERANT GAS
		REDUCE AIR FLOW
		PREVENT AIR STRATIFICATION
		INSTALL TIME CLOCKS
		BOILER OXYGEN TRIM CONTROL (FIXED OR PORTABLE)
		REVISE BOILER CONTROLS
	✓	CHILLER REPLACEMENT
	✓	CHILLER CONTROLS
		REPLACE ABSORBTION CHILLER
		REDUCE STREET LIGHTS
		INSULATE STEAM AND CONDENSATE LINES
		RETURN CONDENSATE
		HEAT RECLAIM FROM FAMILY HOUSING CONDENSER UNITS FOR PREHEATING DOMESTIC HOT WATER
		DOMESTIC HOT WATER HEAT PUMPS
		TRANSFORMER OVER VOLTAGE
		TRANSFORMER LOADING
	✓	REVISE OR REPAIR BUILDING BUILDING HVAC CONTROLS
		WASTE HEAT RECOVERY

SELECTED ECOs TO BE ANALYZED

(As a minimum, evaluation should include but not be limited to the ECOs listed)

HOSPITAL(KWAJ)	HOSPITAL FACILITIES	*ENERGY CONSERVATION OPPORTUNITIES*
		THERMAL STORAGE
		STEAM TRAP INSPECTION
		INSTANTANEOUS HOT WATER HEATER
		AIR CURTAINS
✓		OCCUPANCY SENSORS TO CONTROL LIGHTING OR HVAC
✓		REFLECTORS FOR FLUORESCENT FIXTURES
		WATER SPRAY ROOF COOLING
✓		PHOTOCELLS TO CONTROL LIGHTING
✓		LOW EMISSIVITY WINDOWS
		SEPARATE SWITCHES TO CONTROL LIGHTING ARRANGEMENTS
✓		REPLACE CENTRAL STATION AHU

ANNEX C

REQUIRED DD FORM 1391 DATA

To facilitate ECIP project approval, the following supplemental data shall be provided:

a. In title block clearly identify projects as "ECIP."

b. Complete description of each item of work to be accomplished including quantity, square footage, etc.

c. A comprehensive list of buildings, zones, or areas including building numbers, square foot floor area, designated temporary or permanent, and usage (administration, patient treatment, etc.).

d. List references, and assumptions, and provide calculations to support dollar and energy savings, and indicate any added costs.

(1) If a specific building, zone, or area is used for sample calculations, identify building, zone or area, category, orientation, square footage, floor area, window and wall area for each exposure.

(2) Identify weather data source.

(3) Identify infiltration assumptions before and after improvements.

(4) Include source of expertise and demonstrate savings claimed. Identify any special or critical environmental conditions such as pressure relationships, exhaust or outside air quantities, temperatures, humidity, etc.

e. Claims for boiler efficiency improvements must identify data to support present properly adjusted boiler operation and future expected efficiency. If full replacement of boilers is indicated, explain rejection of alternatives such as replace burners, nonfunctioning controls, etc. Assessment of the complete existing installation is required to make accurate determinations of required retrofit actions.

f. Lighting retrofit projects must identify number and type of fixtures, and wattage of each fixture being deleted and installed. New

lighting shall be only of the level to meet current criteria. Lamp changes in existing fixtures is not considered an ECIP type project.

g. An ECIP life cycle cost analysis summary sheet as shown in the ECIP Guidance shall be provided for the complete project and for each discrete part included in the project. The SIR is applicable to all segments of the project. Supporting documentation consisting of basic engineering and economic calculations showing how savings were determined shall be included.

h. The DD Form 1391 face sheet shall include, for the complete project, the annual dollar and MBTU savings, SIR, simple amortization period and a statement attesting that all buildings and retrofit actions will be in active use throughout the amortization period.

i. The calendar year in which the cost was calculated shall be clearly shown on the DD Form 1391.

j. For each temporary building included in a project, separate documentation is required showing (1) a minimum 10-year continuing need, based on the installation's annual real property utilization survey, for active building retention after retrofit, (2) the specific retrofit action applicable and (3) an economic analysis supporting the specific retrofit.

k. Nonappropriated funded facilities will not be included in an ECIP project without an accompanying statement certifying that utility costs are not reimbursable.

l. Any requirements required by ECIP guidance dated 25 April 1988 and any revisions thereto. Note that unescalated costs/savings are to be used in the economic analyses.

m. The five digit category number for all ECIP projects except for Family Housing is 80000. The category code number for Family Housing projects is 71100.

ANNEX D

EXECUTIVE SUMMARY GUIDELINE

1. Introduction.

2. Building Data (types, number of similar buildings, sizes, etc.)

3. Present Energy Consumption.

   o Total Annual Energy Used.

   o Source Energy Consumption.

   Electricity - KWH, Dollars, BTU
   Fuel Oil - GALS, Dollars, BTU
   Natural Gas - THERMS, Dollars, BTU
   Propane - GALS, Dollars, BTU
   Other - QTY, Dollars, BTU

   o Energy Consumption of the buildings in this study as compared to the basewide consumption.

4. Historical Energy Consumption.

5. Reevaluated Projects Results.

6. Energy Conservation Analysis.

   o ECOs Investigated.

   o ECOs Recommended.

   o ECOs Rejected. (Provide economics or reasons)

   o ECIP Projects Developed. (Provide list)*

   o Non-ECIP Projects Developed. (Provide list)*

   o Operational or Policy Change Recommendations.

* Include the following data from the life cycle cost analysis summary sheet: the cost (construction plus SIOH), the annual energy savings (type and amount), the annual dollar savings, the SIR, the simple payback period and the analysis date. For all programmed projects also include the year in which it is programmed and the programmed year cost.

7. Energy and Cost Savings.

   o Total Potential Energy and Cost Savings.

   o Percentage of Energy Conserved.

   o Energy Use and Cost Before and After the Energy Conservation Opportunities are Implemented.

8. Energy Plan.

   o Project Breakouts with Total Cost and SIR.

   o Schedule of Energy Conservation Project Implementation