

FINAL SUBMITTAL

ENERGY SURVEY OF
ARMY INDUSTRIAL FACILITIES
ENERGY ENGINEERING ANALYSIS PROGRAM
LETTERKENNY ARMY DEPOT
CHAMBERSBURG, PENNSYLVANIA

EXECUTIVE SUMMARY

CONTRACT NO. DACA65-91-C-0071

DISTRIBUTION STATEMENT A

Approved for public release
Distribution Unlimited

PREPARED FOR:

U.S. ARMY CORPS OF ENGINEERS
NORFOLK, VIRGINIA

ERIC QUALITY INSPECTED 2

PREPARED BY:

REYNOLDS, SMITH AND HILLS, INC.
ENERGY AND ENVIRONMENTAL SERVICES DEPARTMENT
P.O. BOX 4850
JACKSONVILLE, FLORIDA 32201
904/279-2277

RS&H PROJECT NO. 2900379001

JANUARY 1992

19971021 290



DEPARTMENT OF THE ARMY
CONSTRUCTION ENGINEERING RESEARCH LABORATORIES, CORPS OF ENGINEERS
P.O. BOX 9005
CHAMPAIGN, ILLINOIS 61826-9005

REPLY TO
ATTENTION OF: TR-I Library

17 Sep 1997

Based on SOW, these Energy Studies are unclassified/unlimited.
Distribution A. Approved for public release.

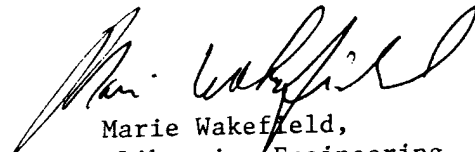

Marie Wakefield,
Librarian Engineering

TABLE OF CONTENTS
EXECUTIVE SUMMARY

| <u>Section</u> | <u>Title</u> | <u>Page</u> |
|----------------|------------------------------|-------------|
| 1.0 | INTRODUCTION | ES-1 |
| 2.0 | INSTALLATION DESCRIPTION | ES-2 |
| 3.0 | ENERGY CONSUMPTION | ES-4 |
| 4.0 | ENERGY CONSERVATION ANALYSIS | ES-9 |
| 5.0 | ENERGY PLAN | ES-16 |

EXECUTIVE SUMMARY

1.0 INTRODUCTION

1.1 Authorization

The Energy Engineering Analysis Program (EEAP), Energy Survey of Army Industrial Facility (ESAIF), Letterkenny Army Depot, Pennsylvania was authorized by the Department of the Army, Norfolk District Corps of Engineers, under Contract Number DACA65-91-C-0071. The objective of this study is to identify, evaluate and develop energy-saving projects which meet the criteria of the Department of the Army's many energy funding programs.

1.2 Report Organization

The report consists of an Executive Summary and four volumes. Volume I, the Narrative Report, contains the results of all of the site surveys, analysis and project development. All backup data and calculations are found in Volume II. The site survey notes are in Volume III, and project documentation forms necessary for receiving funding are in Volume IV.

2.0 INSTALLATION DESCRIPTION

Letterkenny Army Depot is located north of I-85 in South Central Pennsylvania, about five miles north of Chambersburg and eight miles southwest of Shippensburg. The facility was built in 1942 for ordnance storage and tank maintenance during World War II. The facilities at LEAD have evolved and improved but the basic mission is still supply, ammunition and maintenance. The ten directorates at LEAD which combine to perform this mission are:

- o Maintenance
- o Ammunition
- o Supply
- o Quality Assurance
- o Resource Management
- o Information Management
- o Contracting
- o Engineering and Logistics
- o Personnel and Community Activities
- o Law Enforcement and Security

The LEAD facilities cover over 20,000 acres of land and include about 980 buildings. The employment level as of September 1990 was 4,656. Figure 2-1 is a site plan of LEAD and shows the location of the various production facilities. The industrial areas (and Directorate) covered under the scope of work for this study include:

- o Vehicle Maintenance (Maintenance)
- o Electronic Systems Maintenance (Maintenance)
- o Engine/Transmission Maintenance (Maintenance)
- o Vehicle Care and Painting (Supply)
- o Major Item Storage (Supply)
- o Secondary Item Storage and Distribution (Supply)
- o General Plant
 - Process Heating Systems
 - Space Heating Systems
 - Water Treatment Facilities

3.0 ENERGY CONSUMPTION

Total facility and production energy consumption at LEAD decreased by approximately 7.6 percent from FY 88 through FY 91 (Figure 3-1). The cause for the decrease was because of decreases in use of primary boiler fuels (FSR and FSD), which was related to weather. Electricity consumption, on the other hand, has remained relatively constant, showing a 2.5-percent increase over the same time period.

Monthly consumption of boiler fuels and electricity for FY 88-91 is shown in Figure 3-2. The strong dependence of boiler fuels on weather is readily apparent, although some steam is generated during the summer months for uses other than heating. Electricity use is fairly constant throughout the year, showing that almost all electricity consumption is strictly work related.

Percentages of fuel use for FY 90 are shown in Figure 3-3. The two primary boiler fuels accounted for approximately 63 percent of energy use in that year. However, energy costs by fuel type show a different picture (Figure 3-3a). The higher price paid for electricity causes it to represent the largest part of the annual LEAD utility bill at 61 percent. Also, due to the recent trend in decreasing energy prices, total annual energy costs at LEAD decreased by 18.3 percent from FY 88 through FY 91 (Figure 3-4).

Letterkenny Army Depot Historical Energy Use

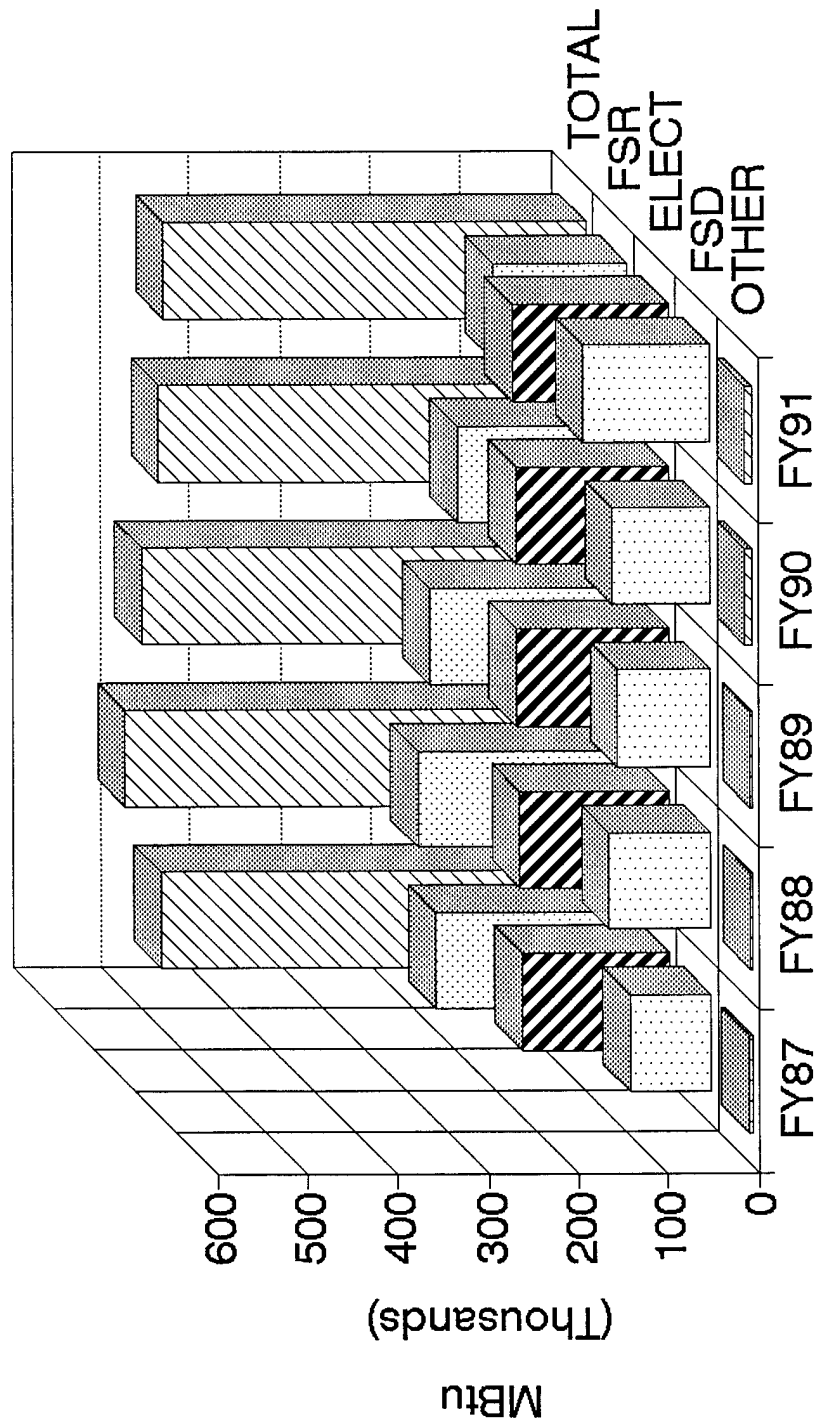


Figure 3-1

Letterkenny Army Depot Energy Consumption FY88-FY91

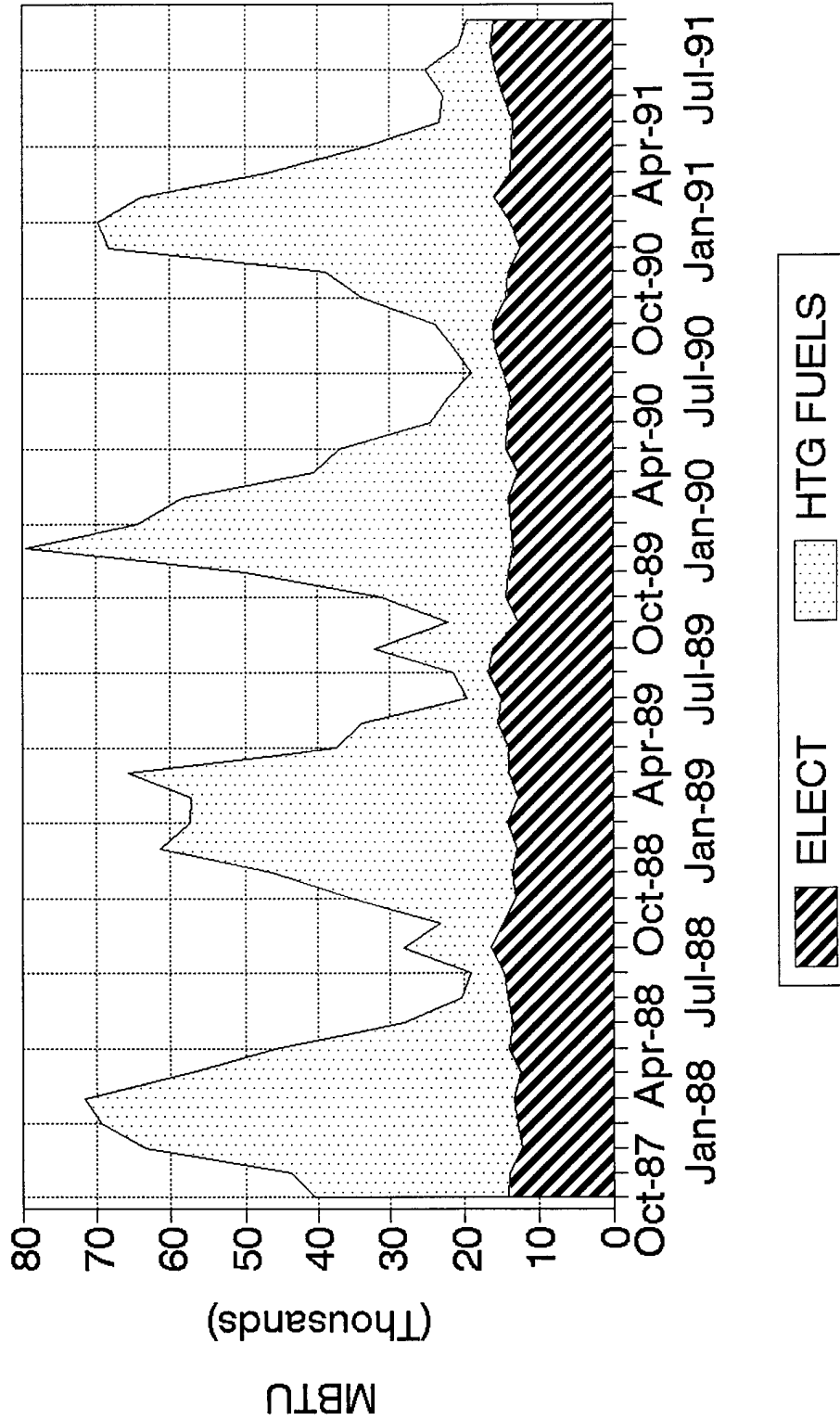
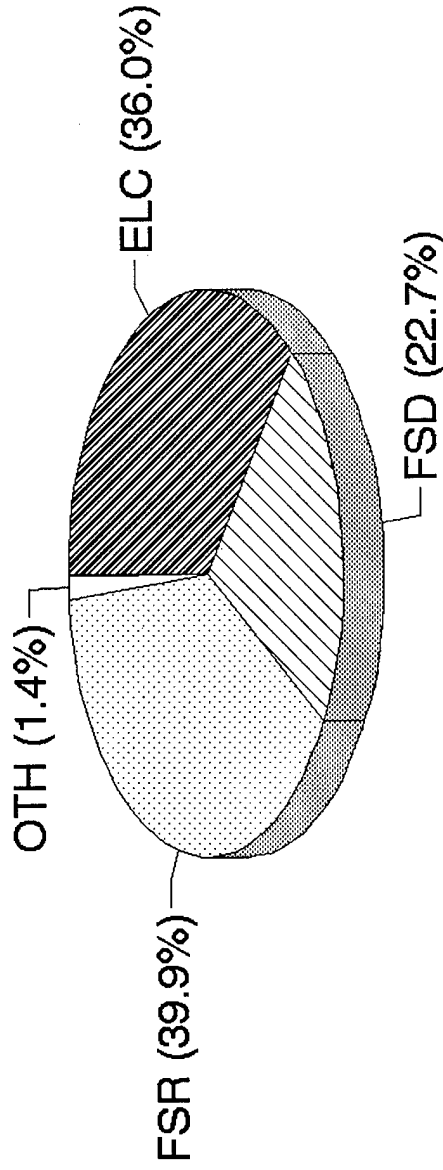


Figure 3-2

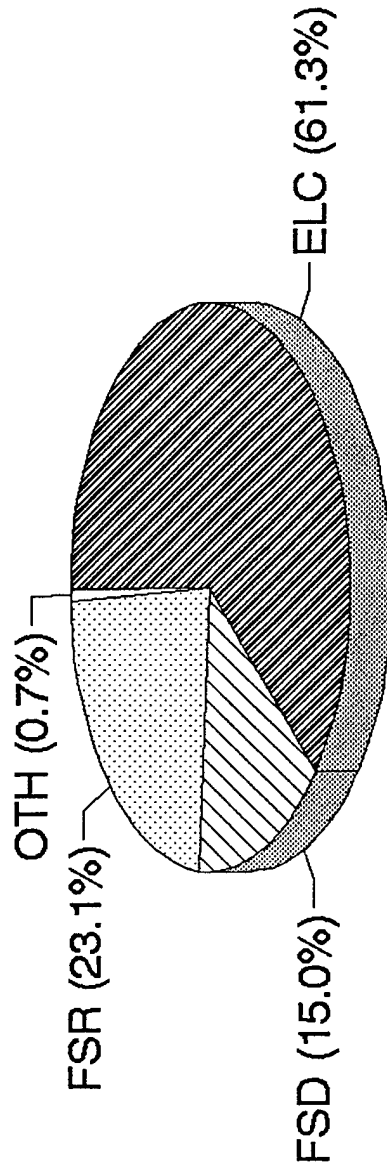
Letterkenny Army Depot FY90 Facility Energy Use



Total Use = 472,493 MBtu

Figure 3-3

Letterkenny Army Depot FY90 Facility Energy Cost



Total Cost = \$2,895,000

Figure 3-3a

Letterkenny Army Depot Historical Energy Cost

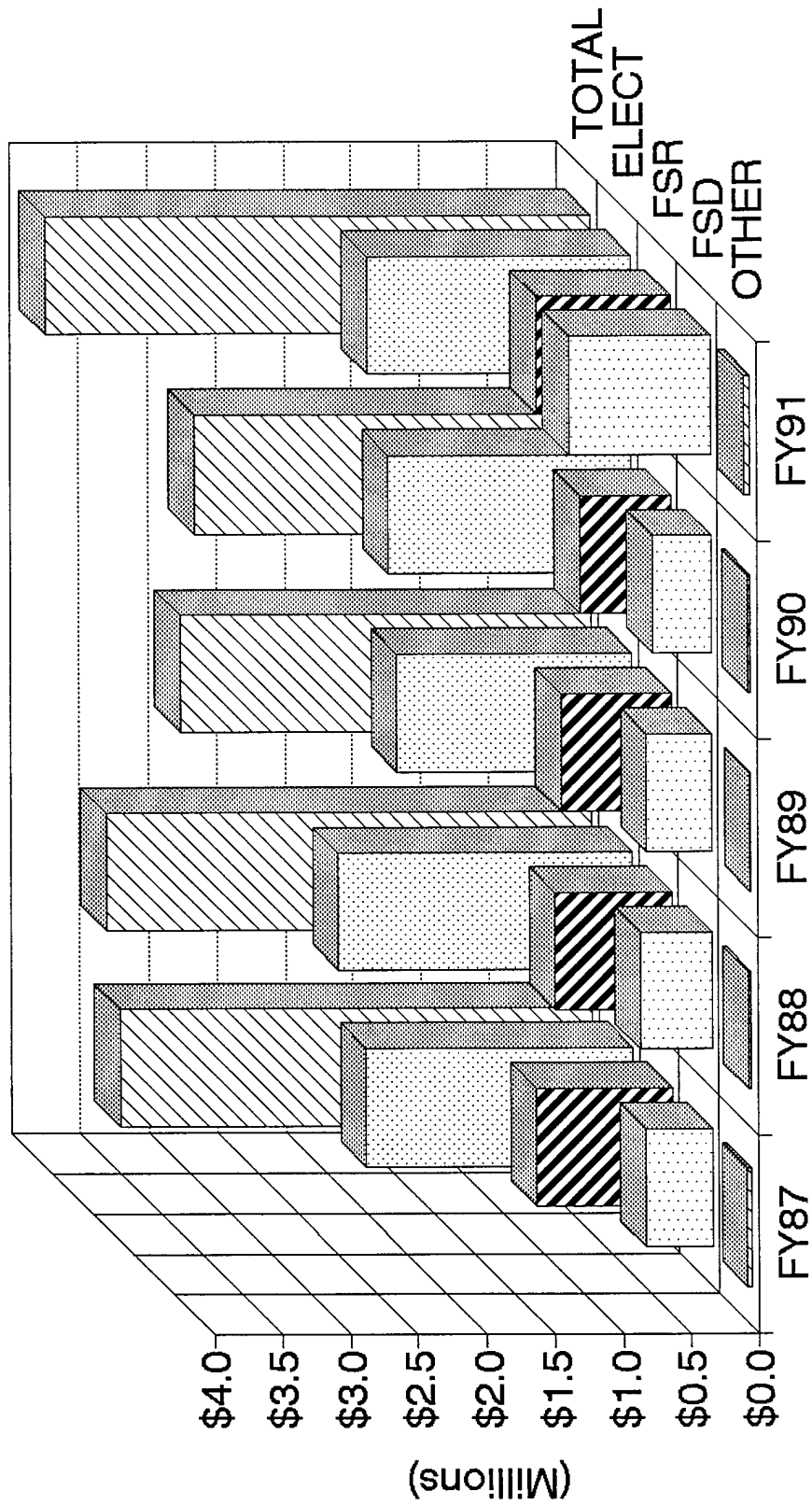


Figure 3-4

4.0 ENERGY CONSERVATION ANALYSIS

4.1 Energy Conservation Opportunity (ECO) Evaluations

Each of the ECOs listed in the Scope of Work plus others were reviewed for their applicability and potential for significant energy savings and cost effectiveness for buildings representative of high energy consumption process areas at LEAD. The buildings actually surveyed vary slightly from the list in the scope of work, but the intent of the survey was accomplished--to survey and investigate energy savings in the major energy users in all active production areas. The results of this assessment are contained in tables in Volume II, Appendix B.

For each of the ECOs that were chosen to be evaluated, energy savings were calculated, cost estimates made and Life Cycle Cost Analyses performed. A summary of the results are contained in Tables 4-1 and 4-2. The evaluated ECOs are described and listed in Table 4-1. An alphabetical listing of evaluated ECOs along with a summary of the energy and cost savings analysis is shown in Table 4-2. Table 4-3 contains a listing prioritized by SIR. Table 4-4 contains a list prioritized by simple payback. Backup data and calculations are contained in Appendix B.

The ECO numbers are of the form ECO # or ECO X-UP where # represents a number and X represents a letter. The ECOs with letters designate an ECO that is being updated from a previous EEAP Study. The sequentially numbered ECOs are new ones.

4.2 Operations and Maintenance Energy Savings

4.2.1 Energy Savings Ideas. As a result of the site visit to LEAD, several operations and maintenance (O&M) energy savings ideas were identified. Energy and economic analyses were performed for these recommendations. Recommendations are listed below.

- o Upon Failure, Replace Fluorescent Lamps with Energy-Efficient Types.

Table 4-1. ECOs Evaluated - Titles

| No | ECO # | Description |
|----|--------|--|
| 1 | 1 | Compressed air valve replacement in Building 350 |
| 2 | 2 | Change "Steam" clean heating method in Bldgs. 349 & 351 |
| 3 | 3 | Dip tank covers in Buildings 1, 37, 350 & 370 |
| 4 | 4 | Heat recovery from paint booth exhaust air |
| 5 | 5 | EMCS in Building 370 |
| 6 | 6 | Heat recovery from condensate in Building 349 |
| 7 | 7 | No. 6 fuel oil recirculation control in Building 349 |
| 8 | 8 | Reflectors for fluorescent fixtures in Buildings 5 & 370 |
| 9 | 9 | Paint booth fan controls |
| 10 | 10 | Paint booth air flow control in Buildings 320 & 350 |
| 11 | 11 | Blast booth fan cut off in Buildings 37 & 350 |
| 12 | 12 | Boiler conversion to #5 fuel oil in Bldgs. 2, 8, 37 & 320 |
| 13 | 13 | Energy efficient fluorescent lamps in Building 370 |
| 14 | 14 | Energy efficient frequency converters in Building 370 |
| 15 | 15 | Modular offices in Buildings 6-South, 8 & 9 |
| 16 | 16 | Boiler conversion to natural gas in ten buildings |
| 17 | D-UP | Heat recovery from paint booths and engine test cells |
| 18 | E-UP | Vapor barrier for dehumidified warehouses |
| 19 | G-UP | Dip tank exhaust heat recovery in Building 350-North |
| 20 | H-UP | Baghouse insulation & exhaust air return in Bldgs. 37 & 35 |
| 21 | I-UP | Large paint booth exhaust heat recovery in Building 350 |
| 22 | J-UP | Medium paint booth exhaust heat recovery in Building 350 |
| 23 | N-UP | Window & wall insulation in Bldgs. 422, 424, 426, 433 & 43 |
| 24 | R-UP | High pressure sodium lighting in Bldgs. 31 - 34 & 41 - 44 |
| 25 | G-E-UP | Paint booth exhaust heat recovery in Building 1 |
| 26 | G-F-UP | Paint booth exhaust heat recovery in Building 14 |
| 27 | G-G-UP | Paint booth exhaust heat recovery in Building 37 |
| 28 | G-I-UP | Dip tank exhaust heat recovery in Building 350-South |
| 29 | G-J-UP | Main steam system expansion to Building 320 |
| 30 | G-N-UP | Warehouse door seals in Buildings 2 and 4 |
| 31 | G-P-UP | Strip curtains for warehouse doors in Building 2 and 4 |
| 32 | G-U-UP | Storm windows in Building 3 |
| 33 | G-V-UP | Loading dock door seals for Building 2 |

Table 4-2. ECO Evaluations - Results

| No. | ECO # | Construction Cost Plus SIOH | Savings (Increase), MBtu/Year | | | Net Cost Savings | SIR | Simple Payback (Years) |
|-----|--------|-----------------------------|-------------------------------|--------|----------|------------------|------|------------------------|
| | | | Elec | Dist | Resid | | | |
| 1 | 1 | \$7,671 | 366 | - | - | \$4,004 | 7.5 | 2.0 |
| 2 | 2 | \$15,985 | - | - | - | - | - | - |
| 3 | 3 | \$198,942 | 2,496 | - | 26,034 | \$137,400 | 10.0 | 1.5 |
| 4 | 4 | - | - | - | - | - | - | - |
| 5 | 5 | \$172,629 | 2,640 | - | 6,536 | \$57,700 | 4.3 | 3.2 |
| 6 | 6 | \$2,557 | - | - | 938 | \$4,100 | 38.6 | 0.7 |
| 7 | 7 | - | - | - | - | - | - | - |
| 8 | 8 | \$33,778 | 613 | - | - | \$6,711 | 2.8 | 5.3 |
| 9 | 9 | \$4,858 | 124 | - | 4,895 | \$22,900 | 71.0 | 0.2 |
| 10 | 10 | \$224,367 | 1,503 | 5,674 | 4,397 | \$64,100 | 3.8 | 3.7 |
| 11 | 11 | \$6,888 | 1,610 | - | - | \$17,613 | 26.0 | 0.4 |
| 12 | 12 | \$94,587 | - | 32,504 | (32,504) | \$26,653 | -2.7 | 3.8 |
| 13 | 13 | \$19,400 | 153 | - | - | \$1,677 | 1.2 | 12.2 |
| 14 | 14 | \$147,457 | 567 | - | - | \$6,203 | 0.6 | 25.1 |
| 15 | 15 | \$24,637 | (20) | 2,775 | - | \$13,600 | 11.2 | 1.9 |
| 16 | 16 | \$2,415,158 | (750) | 36,513 | 226,569 | \$160,200 | 3.1 | 15.9 |
| 17 | D-UP | \$310,602 | 5,937 | 2,425 | - | \$9,819 | 1.0 | 33.4 |
| 18 | E-UP | \$799,693 | (107) | - | - | \$49,791 | 0.9 | 17.0 |
| 19 | G-UP | \$225,142 | - | - | 6,453 | \$27,300 | 2.9 | 8.7 |
| 20 | H-UP | \$132,659 | - | - | 2,988 | \$13,200 | 2.4 | 10.6 |
| 21 | I-UP | \$382,805 | (1,111) | - | 3,703 | \$12,322 | 1.1 | 32.8 |
| 22 | J-UP | \$382,804 | (1,010) | - | 3,644 | \$13,037 | 1.1 | 31.0 |
| 23 | N-UP | \$122,307 | - | - | 2,749 | \$13,700 | 2.3 | 9.4 |
| 24 | R-UP | \$287,199 | 465 | - | - | \$5,087 | 0.3 | 59.7 |
| 25 | G-E-UP | \$115,821 | (141) | - | 510 | \$1,829 | 0.5 | 67.0 |
| 26 | G-F-UP | \$93,779 | (90) | - | 325 | \$1,164 | 0.4 | 85.2 |
| 27 | G-G-UP | \$115,821 | (109) | - | 393 | \$1,405 | 0.4 | 87.1 |
| 28 | G-I-UP | \$40,123 | (78) | - | 338 | \$1,381 | 1.0 | 30.7 |
| 29 | G-J-UP | \$1,065,732 | - | 8,780 | 8,780 | \$7,200 | 0.0 | 147.4 |
| 30 | G-N-UP | \$51,320 | - | 900 | 1,982 | \$6,300 | 4.0 | 8.6 |
| 31 | G-P-UP | \$31,981 | - | 598 | 508 | \$611 | 2.2 | 55.3 |
| 32 | G-U-UP | \$29,144 | - | - | 255 | \$1,176 | 1.0 | 26.2 |
| 33 | G-V-UP | \$27,282 | - | - | 345 | \$1,500 | 1.3 | 19.0 |

Table 4-3. ECO Evaluations - Results Prioritized by SIR

| No. | ECO # | Construction Cost Plus SIOH | Savings (Increase), MBtu/Year | | N Gas | Net Cost Savings | SIR | Simple Payback (Years) |
|-----|--------|-----------------------------|-------------------------------|--------|-----------|------------------|------|------------------------|
| | | | Elec | Dist | | | | |
| 1 | 9 | \$4,858 | 124 | - | 4,895 | \$22,900 | 71.0 | 0.2 |
| 2 | 6 | \$2,557 | - | - | 938 | \$4,100 | 38.6 | 0.7 |
| 3 | 11 | \$6,888 | 1,610 | - | - | \$17,613 | 26.0 | 0.4 |
| 4 | 15 | \$24,637 | (20) | 2,775 | - | \$13,600 | 11.2 | 1.9 |
| 5 | 3 | \$198,942 | 2,496 | - | - | \$137,400 | 10.0 | 1.5 |
| 6 | 1 | \$7,671 | 366 | - | 26,034 | \$4,004 | 7.5 | 2.0 |
| 7 | 5 | \$172,629 | 2,640 | - | - | \$57,700 | 4.3 | 3.2 |
| 8 | G-N-UP | \$51,320 | - | 900 | - | \$6,300 | 4.0 | 8.6 |
| 9 | 10 | \$224,367 | 1,503 | 5,674 | - | \$64,100 | 3.8 | 3.7 |
| 10 | 16 | \$2,415,158 | - | 36,513 | (263,082) | \$160,200 | 3.1 | 15.9 |
| 11 | G-UP | \$225,142 | (107) | - | - | \$27,300 | 2.9 | 8.7 |
| 12 | 8 | \$33,778 | 613 | - | - | \$6,711 | 2.8 | 5.3 |
| 13 | H-UP | \$132,659 | - | - | 2,988 | \$13,200 | 2.4 | 10.6 |
| 14 | N-UP | \$122,307 | - | - | 2,749 | \$13,700 | 2.3 | 9.4 |
| 15 | G-P-UP | \$31,981 | - | 598 | - | \$611 | 2.2 | 55.3 |
| 16 | G-V-UP | \$27,282 | - | - | 508 | \$1,500 | 1.3 | 19.0 |
| 17 | 13 | \$19,400 | 153 | - | 345 | \$1,677 | 1.2 | 12.2 |
| 18 | I-UP | \$382,805 | (1,111) | - | 3,703 | \$12,322 | 1.1 | 32.8 |
| 19 | J-UP | \$382,804 | (1,010) | - | 3,644 | \$13,037 | 1.1 | 31.0 |
| 20 | D-UP | \$310,602 | (750) | 425 | 2,249 | \$9,819 | 1.0 | 33.4 |
| 21 | G-I-UP | \$40,123 | (78) | - | 338 | \$1,381 | 1.0 | 30.7 |
| 22 | G-U-UP | \$29,144 | - | - | 255 | \$1,176 | 1.0 | 26.2 |
| 23 | E-UP | \$799,693 | 5,937 | - | - | \$49,791 | 0.9 | 17.0 |
| 24 | 14 | \$147,457 | 567 | - | - | \$6,203 | 0.6 | 25.1 |
| 25 | G-E-UP | \$115,821 | (141) | - | 510 | \$1,829 | 0.5 | 67.0 |
| 26 | G-F-UP | \$93,779 | (90) | - | 325 | \$1,164 | 0.4 | 85.2 |
| 27 | G-G-UP | \$115,821 | (109) | - | 393 | \$1,405 | 0.4 | 87.1 |
| 28 | R-UP | \$287,199 | 465 | - | - | \$5,087 | 0.3 | 59.7 |
| 29 | G-J-UP | \$1,065,732 | - | 8,780 | 8,780 | \$7,200 | 0.0 | 147.4 |
| 30 | 12 | \$94,587 | - | 32,504 | (32,504) | \$26,653 | -2.7 | 3.8 |
| 31 | 2 | \$15,985 | - | - | - | - | - | - |
| 32 | 7 | - | - | - | - | - | - | - |
| 33 | 4 | - | - | - | - | - | - | - |

Table 4-4. ECO Evaluations - Results Prioritized by Simple Payback

| No. | ECO # | Construction Cost Plus SIOH | Savings (Increase), MBtu/Year | | Resid | N Gas | Net Cost Savings | SIR | Simple Payback (Years) |
|-----|--------|-----------------------------|-------------------------------|-------|---------|-----------|------------------|------|------------------------|
| | | | Etec | Dist | | | | | |
| 1 | 9 | \$4,858 | 124 | - | 4,895 | - | \$22,900 | 71.0 | 0.2 |
| 2 | 11 | \$6,888 | 1,610 | - | - | - | \$17,613 | 26.0 | 0.4 |
| 3 | 6 | \$2,557 | - | - | 938 | - | \$4,100 | 38.6 | 0.7 |
| 4 | 3 | \$198,942 | 2,496 | - | 26,034 | - | \$137,400 | 10.0 | 1.5 |
| 5 | 15 | \$24,637 | (20) | - | - | - | \$13,600 | 11.2 | 1.9 |
| 6 | 1 | \$7,671 | 366 | - | - | - | \$4,004 | 7.5 | 2.0 |
| 7 | 5 | \$172,629 | 2,640 | - | 6,536 | - | \$57,700 | 4.3 | 3.2 |
| 8 | 10 | \$224,367 | 1,503 | - | 4,397 | - | \$64,100 | 3.8 | 3.7 |
| 9 | 12 | \$94,587 | - | - | 5,674 | - | \$26,653 | -2.7 | 3.8 |
| 10 | 8 | \$33,778 | 613 | - | 32,504 | - | \$6,711 | -2.8 | 5.3 |
| 11 | G-N-UP | \$51,320 | - | 900 | 1,982 | - | \$6,300 | 4.0 | 8.6 |
| 12 | G-UP | \$225,142 | (107) | - | 6,453 | - | \$27,300 | 2.9 | 8.7 |
| 13 | N-UP | \$122,307 | - | - | 2,749 | - | \$13,700 | 2.3 | 9.4 |
| 14 | H-UP | \$132,659 | - | - | 2,988 | - | \$13,200 | 2.4 | 10.6 |
| 15 | 13 | \$19,400 | 153 | - | - | - | \$1,677 | 1.2 | 12.2 |
| 16 | 16 | \$2,415,158 | - | - | 226,569 | (263,082) | \$160,200 | 3.1 | 15.9 |
| 17 | E-UP | \$799,693 | 5,937 | - | 36,513 | - | \$49,791 | 0.9 | 17.0 |
| 18 | G-V-UP | \$27,282 | - | - | - | - | \$1,500 | 1.3 | 19.0 |
| 19 | 14 | \$147,457 | 567 | - | 345 | - | \$6,203 | 0.6 | 25.1 |
| 20 | G-U-UP | \$29,144 | - | - | 255 | - | \$1,176 | 1.0 | 26.2 |
| 21 | G-I-UP | \$40,123 | (78) | - | 338 | - | \$1,381 | 1.0 | 30.7 |
| 22 | J-UP | \$382,804 | (1,010) | - | 3,644 | - | \$13,037 | 1.1 | 31.0 |
| 23 | I-UP | \$382,805 | (1,111) | - | 3,703 | - | \$12,322 | 1.1 | 32.8 |
| 24 | D-UP | \$310,602 | (750) | - | 2,249 | - | \$9,819 | 1.0 | 33.4 |
| 25 | G-P-UP | \$31,981 | - | - | 508 | - | \$611 | 2.2 | 55.3 |
| 26 | R-UP | \$287,199 | 465 | - | - | - | \$5,087 | 0.3 | 59.7 |
| 27 | G-E-UP | \$115,821 | (141) | - | 510 | - | \$1,829 | 0.5 | 67.0 |
| 28 | G-F-UP | \$93,779 | (90) | - | 325 | - | \$1,164 | 0.4 | 85.2 |
| 29 | G-G-UP | \$115,821 | (109) | - | 393 | - | \$1,405 | 0.4 | 87.1 |
| 30 | G-J-UP | \$1,065,732 | - | 8,780 | 8,780 | - | \$7,200 | 0.0 | 147.4 |
| 31 | 4 | - | - | - | - | - | - | - | - |
| 32 | 7 | - | - | - | - | - | - | - | - |
| 33 | 2 | \$15,985 | - | - | - | - | - | - | - |

- o Upon Failure, Replace Standard Fluorescent Fixture Ballasts with Energy-Efficient Types.
- o Reduce Auxiliary Steam Use in Building 349.
- o Purchase and Use a Portable Flue Gas Analyzer.
- o Implement Various Recommendations for Paint Booths.
- o Turn Off Bleeds on Compressed Air Filters

4.3 Low Cost/No Cost ECOs

During the site survey, several low cost/no cost energy conservation opportunities were found. These were grouped by project type and evaluated for cost effectiveness. Each is analyzed separately and the results are contained in Table 4-5. Detailed calculations can be found in Volume II, Appendix B.

Below are the low cost/no cost projects evaluated.

- LCNC 1: Close Warehouse Doors When Not in Use
- LCNC 2: Turn Off Unneeded Lights
- LCNC 3: Insulate Steam Pipes
- LCNC 4: Turn Off Equipment When Not in Use
- LCNC 5: Repair Strip Curtains at Conveyor Entrance
- LCNC 6: Install Motion Sensor Lighting Controls
- LCNC 7: Repair Steam Leaks
- LCNC 8: Repair Compressed Air Leaks
- LCNC 9: Delamp in Overlighted Areas

Table 4-5. Low Cost/No Cost Projects

| Number | Cost | Energy Savings (MBtu/yr) | | | Energy Cost Savings (\$/yr) |
|--------|--------------|--------------------------|------------|-------------|-----------------------------|
| | | Fuel Oil | | Electricity | |
| | | #2 | #5/6 | | |
| LCNC 1 | 0 | 172 | 0 | 0 | \$817 |
| LCNC 2 | 0 | 0 | 0 | 172 | \$1,874 |
| LCNC 3 | \$6,946 | 1,567 | - | 0 | \$7,804 |
| LCNC 4 | 0 | 0 | 0 | 923 | \$10,087 |
| LCNC 5 | \$4 | 543 | - | 0 | \$2,704 |
| LCNC 6 | \$668 | 0 | 0 | 96 | \$1,043 |
| LCNC 7 | \$2,164 | - | 936 | 0 | \$4,314 |
| LCNC 8 | \$5,367 | 0 | 0 | 1,100 | \$11,750 |
| LCNC 9 | <u>\$536</u> | <u>0</u> | <u>0</u> | <u>45</u> | <u>\$749</u> |
| TOTALS | \$15,685 | <u>2,282</u> | <u>936</u> | 2,336 | \$41,142 |
| | | 3,218 | | | |

5.0 ENERGY PLAN

5.1 Project Package

The ECOs listed in Table 4-2 were evaluated for appropriate funding category. The project scope of work listed the following guidelines on this subject.

| | <u>Project Cost</u> | <u>Simple Payback</u> |
|---------|---------------------|-----------------------|
| QRIP | \$5,000-\$100,000 | ≤ 2 yrs. |
| OSD PIF | > \$100,000 | ≤ 4 yrs. |
| PECIP | > \$100,000 | ≤ 4 yrs. |
| ECIP | > \$200,000 | ≤ 10 yrs., SIR > 1.0 |
| MCA | > \$200,000 | ≤ 25 yrs., ≥ 8 yrs. |

Table 5-1 contains the results of the analysis and lists the ECOs by project funding category.

5.2 Energy and Cost Savings

Energy and cost savings for the recommended project funding are listed in Table 5-2. Project capital costs are escalated at 4 percent per year according to the project implementation schedule as discussed below. Energy costs are presented in constant dollars, using FY 92 prices. Projects #5, EMCS for Building 370 and #16, Boiler Conversion to Natural Gas have been programmed by LEAD into the ECIP program. The implementation of all projects yield a total annual energy savings of 53,400 MBtu and annual cost savings equal to \$475,300. Low cost/no cost projects yield another 5,500 MBtu and \$40,000 annual energy and cost savings, respectively. This totals to 58,900 MBtu and \$515,300 annual savings, which represents reductions of 12 percent and 18 percent, respectively when compared to FY 90 values. Figures 5-1 and 5-2 show energy use and cost, respectively, at LEAD before and after implementation of these projects.

5.3 Project Schedule

Project implementation dates are estimated as follows:

| | |
|---------------|-------|
| QRIP, OSD PIF | FY 93 |
| ECIP, MCA | FY 95 |

Following this schedule, Figures 5-3 and 5-4 were developed to show the impact implementation the recommended projects would have on energy use and cost, respectively, at LEAD.

Table 5-1. Project Funding List

| Funds | ECO ID | Project Description |
|----------|--------|--|
| QRIP | 1 | Compressed air valve replacement (Building 350) |
| | 6 | Heat recovery from condensate (Building 350) |
| | 9 | Paint booth fan controls (Buildings 37, 350 and 370) |
| | 11 | Blast booth fan cut off (Buildings 37 and 350) |
| | 15 | Modular offices (Buildings 6S, 8, 9) |
| OSD PIF | 3 | Dip tank covers (Buildings 1, 37, 350, 370) |
| | 10 | Paint booth air flow control (Buildings 320, 350) |
| ECIP (1) | 16 | Boiler conversion to natural gas (Building 349) |
| | 5 | EMCS in Building 370 |

(1) Submitted by LEAD as ECIPs.

Table 5-2. Project Energy and Cost Savings

| No. | Project # | ECO Names | Construction Cost Plus SIOH(1) | Annual Energy Savings | | Project Funding | Project Year |
|--------|-----------|---|--------------------------------|-----------------------|---------------|-----------------|--------------|
| | | | | MBtu | \$(2) | | |
| 1 | 9 | Paint booth fan control | \$5,254 | 5,019 | \$22,900 | QRIP | 93 |
| 2 | 11 | Blast booth fan cut off | \$7,450 | 1,610 | \$17,613 | QRIP | 93 |
| 3 | 6 | Heat recovery from condensate | \$2,766 | 938 | \$4,100 | QRIP | 93 |
| 4 | 3 | Dip tank covers with exhaust fan controls | \$214,857 | 28,530 | \$137,400 | OSD PIF | 93 |
| 5 | 15 | Modular offices | \$26,608 | 2,755 | \$13,600 | QRIP | 93 |
| 6 | 1 | Compressed air valve replacement | \$8,285 | 366 | \$4,004 | QRIP | 93 |
| 7 | 5 | EMCS in Building 370 | \$194,184 | 9,176 | \$57,700 | ECIP | 95 |
| 8 | 10 | Paint booth air flow control | \$242,367 | 11,574 | \$64,100 | OSD PIF | 93 |
| 9 | 16 | Boiler conversion to natural gas | \$2,704,976 | 0 | \$160,200 | ECIP | 95 |
| TOTALS | | | \$3,406,747 | 53,400 (3) | \$475,300 (3) | | |

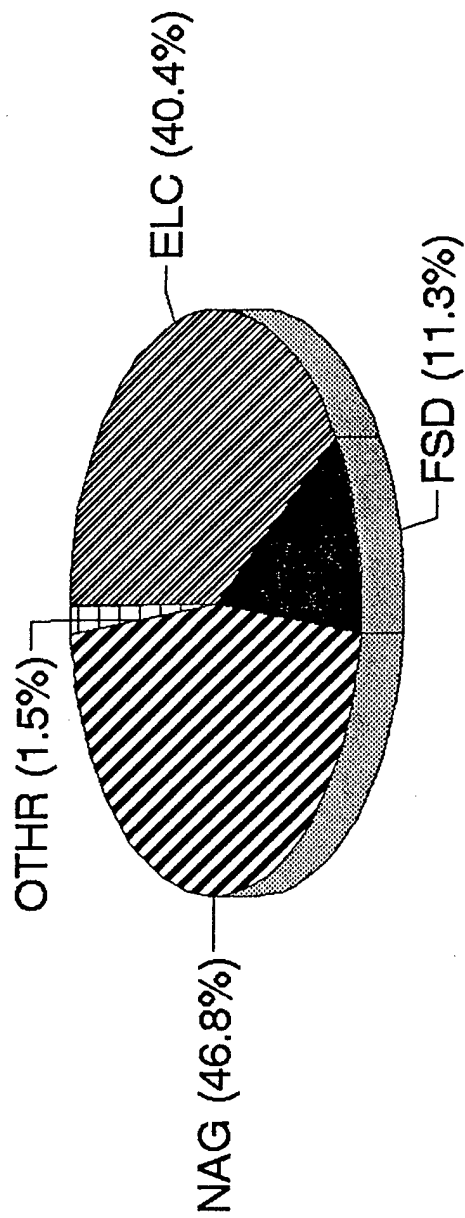
(1) Escalated to year of implementation.

(2) Energy costs are in constant FY92 dollars.

(3) Total does not equal to column sum due to project synergism effects.

Letterkenny Army Depot

Energy Use After Project Implementation



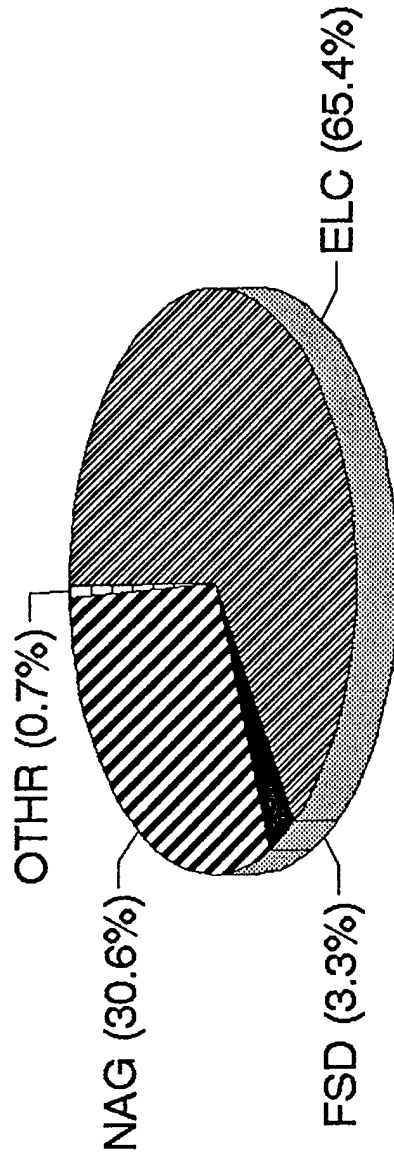
Total Use = 413,400 MBtu

Does not include mobility fuels.

Figure 5-1

Letterkenny Army Depot

Energy Cost after Proj. Implementation



Total Use = \$ 2,800,000

Does not include mobility fuels.

Figure 5-2

Letterkenny Army Depot Effects of Project Implementation

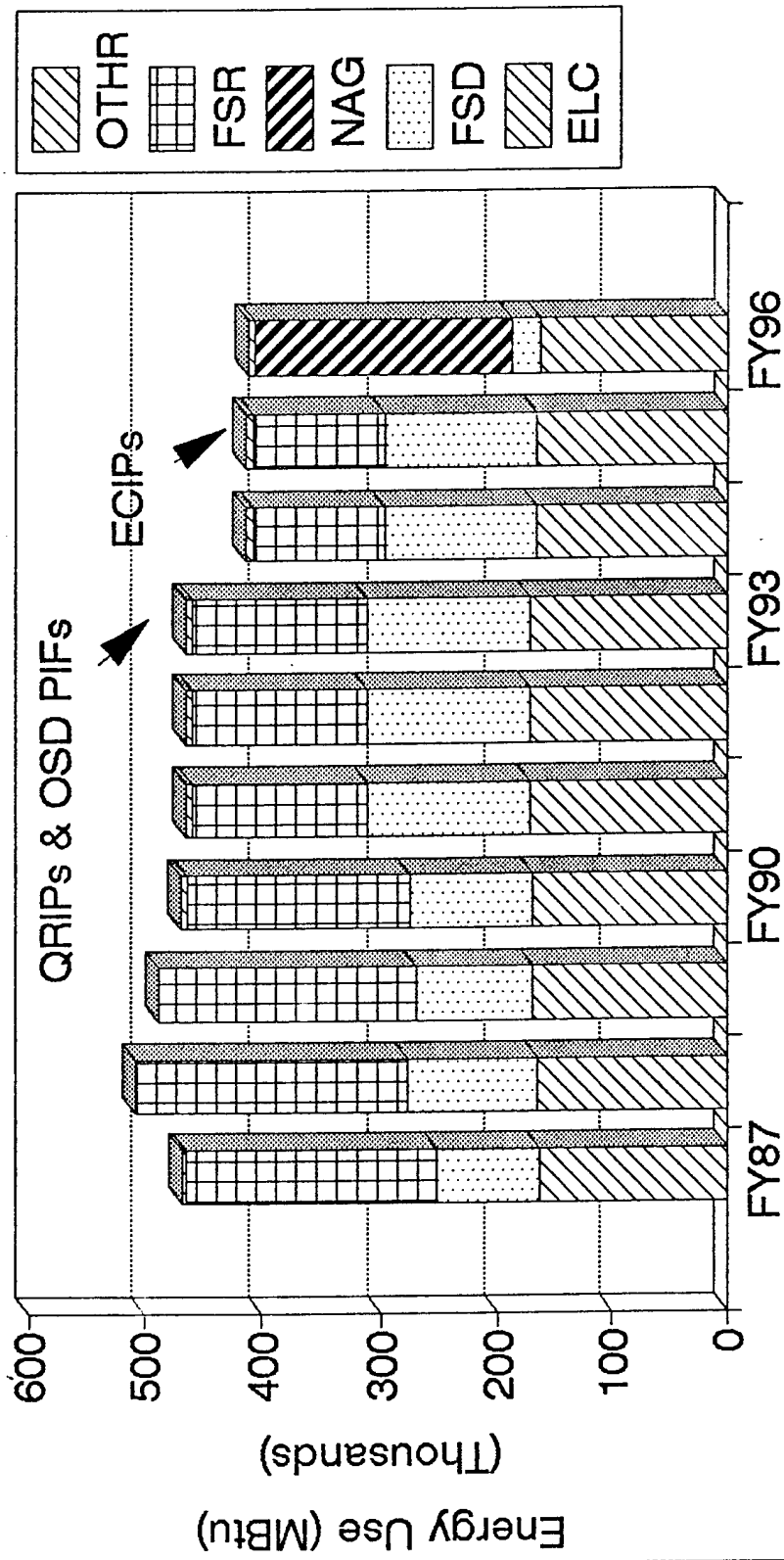


Figure 5-3

Letterkenny Army Depot Effects of Project Implementation

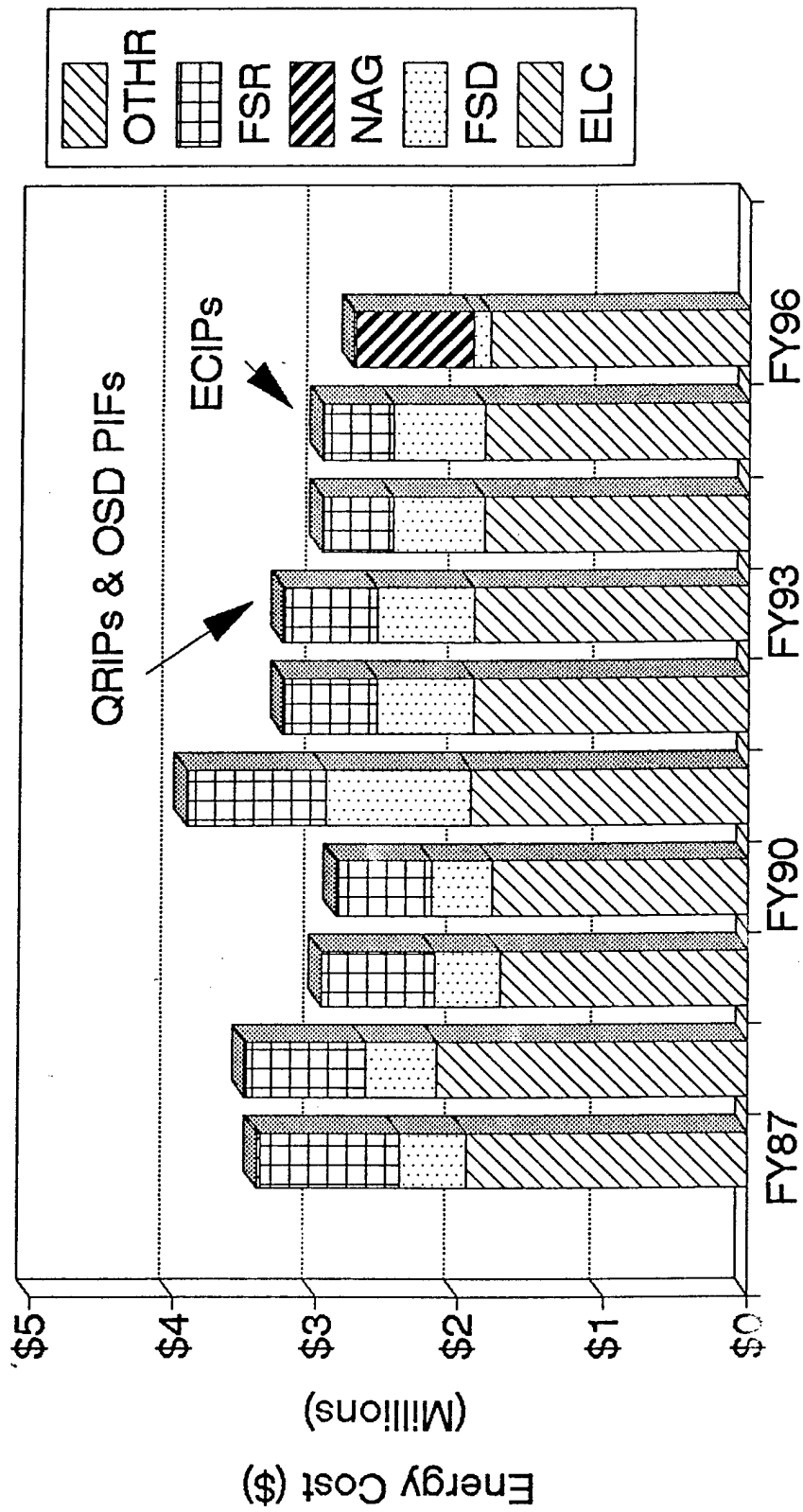


Figure 5-4