FINAL REPORT

A HIGH SEASONAL PERFORMANCE FACTOR GAS HEAT PUMP FOR THE NORTH CENTRAL UNITED STATES

APPENDIX VOLUME VII

LARGE SIZE MODEL COMPARATIVE COST OF OWNERSHIP STUDY

Prepared By: Consolidated Natural Gas Service Company Inc.
Prepared For: The U.S. Department of Energy
Prepared Under: DOE Prime Contract EY-76-C-02-2883

January, 1980

Consolidated Natural Gas Service Company Inc.

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Appendices to Final Report

DEMONSTRATION OF A HIGH SPF GAS HEAT PUMP
FOR THE NORTH CENTRAL UNITED STATES

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APPENDIX VOLUME VII

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1.0 PURPOSE

The purpose of the study was to examine the projected operating and total owning costs of the subject gas-fueled heat pump under development in comparison with other equipment which will be concurrently marketed. The competitive equipment will perform functions similar to those of the gas heat pump except that the primary equipment will be energized with electricity or a combination of electricity and another fuel.

It is expected that the gas-fueled heat pump will have lower annual operating cost but will require a higher relative investment (initial cost) than the comparison equipment. It is desired to determine whether or not the total operating and owning cost of the gas-fueled heat pump is sufficiently lower than the competitive equipment to attract buyers to it on the basis of economics alone. With the exception of the gas heat pump primary equipment ability to operate independent of electrical auxiliary power and expected ability to evidence reasonable maintenance cost, other favorable and unique characteristics of the gas heat pump will not enter into the calculations.

2.0 STUDY OVERVIEW

EXPERIMENT DESIGN

- Computer methodology
- Evaluation parameters
- Comparison techniques
- Structure of results
- Bar charts
- Key observations
- Recommendations

COMPUTER METHODOLOGY

- Building energy requirements
- Building HVAC system simulation
- Building utility costs
- Economic comparisons
- Source energy comparisons

EVALUATION PARAMETERS

- Building types
- HVAC equipment options
- Rate level/weather areas
- Presently-in-force rate forms
- Projected future rate forms
- Escalation of utility costs
- Equipment cost considerations

BUILDING TYPES

- Motel
  - Seven day week operation
  - Variety of HVAC equipment used
- Office building
  - Business week operation
  - Variety of HVAC equipment used

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HVAC EQUIPMENT OPTIONS

(REVISED)

- Motel

  A-1 Electric motor reciprocating compressor and gas-fired hot water boiler

  A-2 Electric motor reciprocating compressor with heat reclaim condensor and electric boiler

  A-5 Gas heat pump - mechanically coupled

  A-6 Gas heat pump - electrically coupled (large heat exchanger)

  A-6.1 Gas heat pump - electrically coupled (medium heat exchanger)

  A-6.2 Gas heat pump - electrically coupled (small heat exchanger)

- Office building

  B-1 Electric motor reciprocating compressor and gas-fired hot water boiler

  B-1.1 Electric motor reciprocating compressor and electric hot water boiler

  B-2 Electric motor reciprocating compressor with heat reclaim condensor and electric boiler

  B-3 Electric motor heat pumps connected with closed water loop

  B-4 Gas heat pump - mechanically coupled

  B-5 Gas heat pump - electrically coupled

RATE LEVEL/WEATHER AREAS

	Electricity/Gas Cost Ratios		Heating Degree Days
	Motel	Office	
Chicago	2.83	5.88	6639
Cleveland	4.47	5.74	6351
New York	3.75	7.18	5219
Dallas	5.11	5.35	2363
Los Angeles	6.28	5.98	2061

PRESENTLY IN-FORCE UTILITY RATES

	Gas	Electricity
Chicago	PGG #2	ICC #6
Cleveland	PUCO #500	PUCO #11
New York	Gen'l Class #2	SC #4
Dallas	Res/Comm Service	Schedule G
Los Angeles	Schedule GNR	CUC A-7

PROJECTED FUTURE UTILITY RATES

	Gas	Electricity
Chicago	General Space Heating Rate #2	TOU Rate #6L
New York	General Service Rate #2	Extrapolated TOU Rate
Los Angeles	General Service Rate GNR	Extropolated TOU Rate #8

METHODS OF ESCALATING UTILITY COSTS

- Sources
  - Department of Energy
  - American Gas Association
- Application
  - DOE and AGA data applied separately
  - Constant weather
  - Constant dollars
  - Adjusted to study start due (1985)
  - No inflation during study period

PROJECTED RATE-LEVEL INCREASES
(% CHANGE 1979-1985)

	Gas		Electricity	
	DOE	AGA	DOE	AGA
Chicago	48.5	7.4	6.2	8.0
Cleveland	71.8	7.4	9.8	8.0
New York	25.0	-2.0	-6.4	-0.9
Dallas	65.5	29.0	27.1	13.3
Los Angeles	57.5	8.1	8.2	6.4

EQUIPMENT COST CONSIDERATIONS

- HVAC systems cost
- Plus associated electrical cost
- Plus GHP premium
  - 50% primary equipment
- Less electrical cost deduction
- Equals GHP total initial cost

Source - Initial cost from consultants
- Premium estimate from MTI

COMPARISON TECHNIQUES

- Respective and relative source energy consumptions
- Relative rate-of-return percentages on investment cost differentials

STRUCTURE OF RESULTS

- Equipment
  - Location comparisons
  - Present rate effects
  - Projected rate effects
  - Future rate form effects

CHARTS

- Types of comparisons
  - Present rates/actual weather
  - Present rates/constant weather
  - DOE projected rates/constant weather
  - AGA projected rates/constant weather
  - Future rate forms/constant weather
  - Packaged equipment versus central system

SOURCE ENERGY

Million BTU per Year

MOTEL

Actual Weather

	A-1	A-2	A-5	A-6
Chicago	11,450	17,784	11,068	10,539
Cleveland	10,823	15,978	10,657	10,126
New York	9.904	13,905	10,088	9.542
Dallas	9,745	11,722	11,181	10,707
Los Angeles	8,248	9,029	9,564	9,055

Gas 1.11 Electricity 3.04

3.0 SUMMARY OF RESULTS TABLES (Tables 3-1 Through 3-5)

TABLE 3-1

BASE STUDY

SUMMARY OF RESULTS/MOTEL

Best GHP (A-6) vs. Best
Competitive System
(Recip. Chiller + Gas Boiler) (A-1)

Location (Utility Rates & Weather)	Basis For Utility Rates	Source Energy Savings (%)	Annual Utility Cost Svgs. (1000's $)	Equip. Cost Premium (1000's $)	Rate of Return (%)
Chicago	/Present	+ 8	+20	+31	13.32
	/DOE Project.	+ 8	+20	+31	3.48
	/AGA Project.	+ 8	+20	+31	14.17
	/Future Schd.	+ 8	+20	+31	13.17
Cleveland	/Present	+ 7 +(27)*	+22	+31	13.75
	/DOE Project.	+ 7	+26	+31	N/C
	/AGA Project.	+ 7	+21	+31	13.78
New York	/Present	+ 4	+22	+31	31.27
	/DOE Project.	+ 4	+19	+31	26.61
	/AGA Project.	+ 4	+23	+31	33.51
	/Future Schd.	+ 4	+29	+31	46.97
Dallas	/Present	-10	+10	+31	- 1.16
	/DOE Project.	-10	+11	+31	6.77
	/AGA Project.	-10	+16	+31	10.43
Los Angeles	/Present	-10	+ 7	+31	N/C**
	/DOE Project.	-10	+ 5	+31	- 8.14
	/AGA Project.	-10	+14	+31	4.66
	/Future Schd.	-10	+20	+31	9.20

Note: MTI Cost Study Equipment Cost Premium = $54,000
* With External Source Heat Pumping
** N/C = Not Computable Because of Negligible, Negative or Zero Savings

TABLE 3-2

BASE STUDY

SUMMARY OF RESULTS/OFFICE BUILDING

Best GHP (B-5) vs. Best Competitive System (Recip. Chiller + Gas Boiler) (B-1)

Location (Utility Rates & Weather	Basis For Utility Rates	Source Energy Savings (%)	Annual Op. Cost Svgs. (1000's $)	Equip. Cost Premium (1000's $)	Rate of Return (%)
Chicago	/Present	- 5	+ 5	+95	N/C*
	/DOE Project.	- 5	+ 2	+95	N/C
	/AGA Project.	- 5	+ 9	+95	-4.48
	/Future Schd.	- 5	+ 6	+95	N/C
Cleveland	/Present	- 9	+ 5	+95	N/C
	/DOE Project.	- 9	+ 1	+95	N/C
	/AGA Project.	- 9	+ 9	+95	-9.48
New York	/Present	-17	+11	+95	-0.45
	/DOE Project.	-17	+ 8	+95	-5.36
	/AGA Project.	-17	+13	+95	0.72
	/Future Schd.	-17	+17	+95	5.80
Dallas	/Present	-35	+ 3	+95	N/C
	/DOE Project.	-35	+ 3	+95	N/C
	/AGA Project.	-35	+ 4	+95	N/C
Los Angeles	/Present	-37	+ 3	+95	N/C
	/DOE Project.	-37	+ 1	+95	N/C
	/AGA Project.	-37	+ 2	+95	N/C
	/Future Schd.	-37	+ 5	+95	-10.14

Note: MTI Cost Study Equipment Cost Premium = $118,000

* N/C = Not Computable Because of Negligible, Negative or Zero Savings.

TABLE 3-3

EXTENSION STUDY

SUMMARY OF RESULTS/MOTEL

SENSITIVITY TO CHANGE OF COOL/HEAT RATIO

ELECTRIC MOTOR RECIPROCATING COMPRESSOR & GAS BOILER (A-1) (REFERENCE SYSTEM)

VERSUS

ELECTRICALLY COUPLED GHP (A-6)

COOL/ HEAT RATIO (FACTOR)	LOCATION (UTILITY RATES & WEATHER)	BASIS FOR UTILITY RATES	SOURCE ENERGY SAVINGS %	ANNUAL UTILITY COST SAVINGS (1000's $)	EQUIPMENT COST PREMIUM (1000's $)	RATE OF RETURN %
0.59 (0.75)	Cleveland and Cleveland	Present	4	9.08	+31	11.48
0.45 (1.00)	Cleveland and Cleveland	Present	6.4	9.84	+31	13.06
0.36 (1.25)	Cleveland and Cleveland	Present	7.7	10.4	+31	14.18

TABLE 3-4

EXTENSION STUDY

SUMMARY OF RESULTS/MOTEL

SENSITIVITY TO CHANGE OF GHP HEAT EXCHANGER AREA

ELECTRIC MOTOR RECIPROCATING COMPRESSOR AND GAS FIRED BOILER (A-1) (REFERENCE SYSTEM)

VERSUS

ELECTRICALLY COUPLED GHP (A-6)(LARGE HX), AND
ELECTRICALLY COUPLED GHP (A-6.1) (MEDIUM HX), AND
ELECTRICALLY COUPLED GHP (A-6.2) (SMALL HX).

HEAT EX-CHANGER SIZE	LOCATION (UTILITY POLE) AND WEATHER	BASIS FOR UTILITY RATES	SOURCE ENERGY SAVINGS %	ANNUAL UTILITY COST SAVINGS (1000's $)	EQUIPMENT COST PRE-MIUM (1000's $)	RATE OF RETURN %
Large (A-6)	Cleveland and Cleveland	Present	6.44	9.84	+31	13.06
Medium (A-6.1)	Cleveland and Cleveland	Present	6.52	6.28	+31	5.00
Small (A-6.2)	Cleveland and Cleveland	Present	6.06	6.08	+31	4.49

TABLE 3-5

EXTENSION STUDY

SUMMARY OF RESULTS/OFFICE

REVISED REFERENCE SYSTEM

ELECTRIC MOTOR RECIPROCATING COMPRESSOR AND ELECTRIC BOILER (B-1.1) (REFERENCE SYSTEM)

VERSUS

ELECTRIC MOTOR RECIPROCATING COMPRESSOR AND GAS BOILER (B-1)

LOCATION: UTILITY RATES AND WEATHER	BASIS FOR UTILITY RATES	SOURCE ENERGY SAVINGS %	ANNUAL UTILITY COST SAVINGS (1000's $)	EQUIPMENT COST PREMIUM (1000's $)	RATE OF RETURN %
Chicago and Cleveland	/Present	17	14.91	2.165	370.51
	/DOE Adj.	17	13.11	2.165	327.54
	/AGA Adj.	17	16.14	2.165	402.73
	/Future	17	14.46	2.165	359.77
Cleveland and Cleveland	/Present	17	13.65	2.165	338.28
	/DOE Adj.	17	11.21	2.165	278.13
	/AGA Adj.	17	14.78	2.165	366.21
New York and Cleveland	/Present	17	30.43	2.165	742.19
	/DOE Adj.	17	25.22	2.165	626.17
	/AGA Adj.	17	30.27	2.165	750.18
	/Future	17	28.40	2.165	707.81
Dallas and Cleveland	/Present	17	13.16	2.165	327.54
	/DOE Adj.	17	14.25	2.165	355.47
	/AGA Adj.	17	13.90	2.165	344.73
Los Angeles and Cleveland	/Present	17	14.64	2.165	364.06
	/DOE Adj.	17	13.15	2.165	327.54
	/AGA Adj.	17	15.76	2.165	391.99
	/Future	17	12.24	2.165	303.91

4.0 CASE DATA SHEETS - SUMMARY OF ECONOMIC COMPARISONS

A Summary of Economic Comparisons for both motel and office-type buildings in several of the study cities is contained in the following tables.

	Tables
• Base Study - Motel	
- Category #1a: Present Rates/Actual Weather	4-1 through 4-5
- Category #2a: Present Rates/Constant Weather	4-6 through 4-10
- Category #4a: Present Rates/Constant Weather DOE Projected Rate-Level Increases	4-11 through 4-15
- Category #4b: Present Rates/Constant Weather AGA Projected Rate-Level Increases	4-16 through 4-20
- Category #4c: Future Rates/Constant Weather	4-21 through 4-23
• Base Study - Office	
- Category #1b: Present Rates/Actual Weather	4-24 through 4-28
- Category #2b: Present Rates/Constant Weather	4-29 through 4-33
- Category #3a: Present Rates/Constant Weather DOE Projected Rate-Level Increases	4-34 through 4-38
- Category #3b: Present Rates/Constant Weather AGA Projected Rate-Level Increases	4-39 through 4-43
- Category #3c: Future Rates/Constant Weather	4-44 through 4-46
• Extension Study - Motel	
- Category #2a: Present Rates/Constant Weather	4-47 through 4-52
• Extension Study - Office	
- Category #2b: Present Rates/Constant Weather	4-53 through 4-57
- Category #3a: Present Rates/Constant Weather DOE Projected Rate-Level Increases	4-58 through 4-62
- Category #3b: Present Rates/Constant Weather AGA Projected Rate-Level Increases	4-63 through 4-67
- Category #3c: Future Rates/Constant Weather	4-68 through 4-70

TABLE 4-1

CHICAGO

SUMMARY OF ECONOMIC COMPARISONS

ECONOMY MOTEL

Category 1a Case No. 1

SYSTEM TITLES:

A-1 Electric motor reciprocating compressor chiller with gas fired hot water boiler

A-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

A-5 Gas Heat Pump -- Mechanically Coupled version

A-6 Gas Heat Pump -- Electrically Coupled version

ANNUAL OPERATING COSTS:

Alternative Systems	A-1	A-2	A-5	A-6
Initial Investment	$315,000	$326,000	$345,868	$345,868
Natural Gas - Annual	$ 13,146	0	$ 21,530	$ 21,472
Electricity - Annual	~~$ 37,364~~ $ 50,510	$ 81,749 $ 81,749	$ 21,013 $ 42,543	$ 19,073 $ 40,545
Maintenance - Annual	$ 6,500	$ 7,300	$ 7,300	$ 7,300
Insurance - Annual (1.0%)	$ 3,150	$ 3,260	$ 3,459	$ 3,459
Ad Valorem Tax - Annual	$ 3,150	$ 3,260	$ 3,459	$ 3,459
First Year Interest (10%)	$ 23,625	$ 24,450	$ 25,940	$ 25,940
First Year Operating Cost	$ 86,935	$120,019	$ 82,701	$ 80,703
Present Worth of Net Cash Flow	$339,383	$452,199	$329,532	$322,779
Rate of Return		N/C	9.05	13.32
Total Source Energy Consumption (MMBTU)	11,450	17,784	11,068	10,539

TABLE 4-2

CLEVELAND

SUMMARY OF ECONOMIC COMPARISONS

ECONOMY MOTEL

Category 1a Case No. 3

SYSTEM TITLES:

A-1 Electric motor reciprocating compressor chiller with gas fired hot water boiler

A-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

A-5 Gas Heat Pump -- Mechanically Coupled version

A-6 Gas Heat Pump -- Electrically Coupled version

ANNUAL OPERATING COSTS:

Alternative Systems	A-1	A-2	A-5	A-6
Initial Investment	$315,000	$326,000	$345,868	$345,868
Natural Gas - Annual	$ 10,584	0	$ 19,191	$ 19,134
Electricity - Annual	$ 35,872	$ 69,858	$ 19,355	$ 17,146
	$ 46,456	$ 69,858	$ 38,546	$ 36,280
Maintenance - Annual	$ 6,500	$ 7,300	$ 7,300	$ 7,300
Insurance - Annual (1.0%)	$ 3,150	$ 3,260	$ 3,459	$ 3,459
Ad Valorem Tax - Annual	$ 3,150	$ 3,260	$ 3,459	$ 3,459
First Year Interest (10.0%)	$ 23,625	$ 24,450	$ 25,940	$ 25,940
First Year Operating Cost	$ 82,881	$108,128	$ 78,704	$ 76,438
Present Worth of Net Cash Flow	$325,680	$412,607	$316,022	$308,363
Rate of Return		N/C	8.92	13.75
Total Source Energy Consumption (MMBTU)	10,823	15,978	10,657	10,126

TABLE 4-3

NEW YORK

SUMMARY OF ECONOMIC COMPARISONS

ECONOMY MOTEL

Category 1a Case No. 4

SYSTEM TITLES: A-1 Electric motor reciprocating compressor chiller with gas fired hot water boiler

A-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

A-5 Gas Heat Pump -- Mechanically Coupled version

A-6 Gas Heat Pump -- Electrically Coupled version

ANNUAL OPERATING COSTS:

Alternative Systems	A-1	A-2	A-5	A-6
Initial Investment	$315,000	$326,000	$345,868	$345,868
Natural Gas - Annual	$ 14,452	0	$ 29,270	$ 29,171
Electricity - Annual	$ 73,879	$128,780	$ 42,875	$ 39,653
	$ 88,331	$128,780	$ 72,145	$ 68,824
Maintenance - Annual	$ 6,500	$ 7,300	$ 7,300	$ 7,300
Insurance - Annual (1.0%)	$ 3,150	$ 3,260	$ 3,459	$ 3,459
Ad Valorem Tax - Annual	$ 3,150	$ 3,260	$ 3,459	$ 3,459
First Year Interest (10.0%)	$ 23,625	$ 24,450	$ 25,940	$ 25,940
First Year Operating Cost	$124,756	$167,050	$112,303	$108,982
Present Worth of Net Cash Flow	$467,220	$611,766	$429,589	$418,364
Rate of Return		N/C	25.25	31.27
Total Source Energy Consumption (MMBTU)	9,904	13,905	10,088	9,542

TABLE 4-4

DALLAS

SUMMARY OF ECONOMIC COMPARISONS

ECONOMY MOTEL

Category 1a Case No. 6

SYSTEM TITLES:

A-1 Electric motor reciprocating compressor chiller with gas fired hot water boiler

A-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

A-5 Gas Heat Pump -- Mechanically Coupled version

A-6 Gas Heat Pump -- Electrically Coupled version

ANNUAL OPERATING COSTS:

Alternative Systems	A-1	A-2	A-5	A-6
Initial Investment	$315,000	$326,000	$345,868	$345,868
Natural Gas - Annual	$ 5,573	0	$ 18,967	$ 18,872
Electricity - Annual	$ 38,150	$ 53,263	$ 22,183	$ 20,673
	$ 43,723	$ 53,263	$ 41,150	$ 39,545
Maintenance - Annual	$ 6,500	$ 7,300	$ 7,300	$ 7,300
Insurance - Annual (1.0%)	$ 3,150	$ 3,260	$ 3,459	$ 3,459
Ad Valorem Tax - Annual	$ 3,150	$ 3,260	$ 3,459	$ 3,459
First Year Interest (10.0%)	$ 23,625	$ 24,450	$ 25,940	$ 25,940
First Year Operating Cost	$ 80,148	$ 91,533	$ 81,308	$ 79,703
Present Worth of Net Cash Flow	$316,442	$356,515	$324,824	$319,399
Rate of Return		N/C	N/C	-1.16
Total Source Energy Consumption (MMBTU)	9745	11,722	11,181	10,707

TABLE 4-5

LOS ANGELES

SUMMARY OF ECONOMIC COMPARISONS

ECONOMY MOTEL

Category 1a Case No. 8

SYSTEM TITLES:

A-1 Electric motor reciprocating compressor chiller with gas fired hot water boiler

A-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

A-5 Gas Heat Pump -- Mechanically Coupled version

A-6 Gas Heat Pump -- Electrically Coupled version

ANNUAL OPERATING COSTS:

Alternative Systems	A-1	A-2	A-5	A-6
Initial Investment	$315,000	$326,000	$345,868	$345,868
Natural Gas - Annual	$ 3,643	0	$ 14,212	$ 14,165
Electricity - Annual	$ 34,213	$ 43,344	$ 22,358	$ 21,041
	$ 37,856	$ 43,344	$ 36,570	$ 35,206
Maintenance - Annual	$ 6,500	$ 7,300	$ 7,300	$ 7,300
Insurance - Annual (1.0%)	$ 3,150	$ 3,260	$ 3,459	$ 3,459
Ad Valorem Tax - Annual	$ 3,150	$ 3,260	$ 3,459	$ 3,459
First Year Interest (100%)	$ 23,625	$ 24,450	$ 25,940	$ 25,940
First Year Operating Cost	$ 74,281	$ 81,614	$ 76,728	$ 75,364
Present Worth of Net Cash Flow	$ 296,611	$322,988	$309,343	$ 304,733
Rate of Return		N/C	N/C	N/C
Total Source Energy Consumption (MMBTU)	8,248	9,029	9,564	9,055

TABLE 4-6

CHICAGO
SUMMARY OF ECONOMIC COMPARISONS

ECONOMY MOTEL

Category 2a Case No. 2

SYSTEM TITLES:
- A-1 Electric motor reciprocating compressor chiller with gas fired hot water boiler
- A-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler
- A-5 Gas Heat Pump -- Mechanically Coupled version
- A-6 Gas Heat Pump -- Electrically Coupled version

ANNUAL OPERATING COSTS:

Alternative Systems	A-1	A-2	A-5	A-6
Initial Investment	$315,000	$326,000	$345,868	$345,868
Natural Gas - Annual	$ 11,234	0	$ 20,415	$ 20,354
Electricity - Annual	$ 38,065	$ 74,418	$ 21,309	$ 19,132
	$ 49,299	$ 74,418	$ 41,724	$ 39,486
Maintenance - Annual	$ 6,500	$ 7,300	$ 7,300	$ 7,300
Insurance - Annual (1.0%)	$ 3,150	$ 3,260	$ 3,459	$ 3,459
Ad Valorem Tax - Annual	$ 3,150	$ 3,260	$ 3,459	$ 3,459
First Year Interest (100%)	$ 23,625	$ 24,450	$ 25,940	$ 25,940
First Year Operating Cost	$ 85,724	$112,688	$ 81,882	$ 79,644
Present Worth of Net Cash Flow	$335,290	$428,019	$326,764	$319,200
Rate of Return		N/C	8.15	13.01
Total Source Energy Consumption (MMBTU)	11,450	17,784	11,068	10,539

TABLE 4-7

CLEVELAND

SUMMARY OF ECONOMIC COMPARISONS

ECONOMY MOTEL

Category 2a Case No. 3

SYSTEM TITLES:

A-1 Electric motor reciprocating compressor chiller with gas fired hot water boiler

A-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

A-5 Gas Heat Pump -- Mechanically Coupled version

A-6 Gas Heat Pump -- Electrically Coupled version

ANNUAL OPERATING COSTS:

Alternative Systems	A-1	A-2	A-5	A-6
Initial Investment	$315,000	$326,000	$345,868	$345,868
Natural Gas - Annual	$ 10,584	0	$ 19,191	$ 19,134
Electricity - Annual	$ 35,382	$ 69,858	$ 19,335	$ 17,446
	$ 45,966	$ 69,358	$ 38,526	$ 36,580
Maintenance - Annual	$ 6,500	$ 7,300	$ 7,300	$ 7,300
Insurance - Annual (1.0%)	$ 3,150	$ 3,260	$ 3,459	$ 3,459
Ad Valorem Tax - Annual	$ 3,150	$ 3,260	$ 3,459	$ 3,459
First Year Interest (100%)	$ 23,625	$ 24,450	$ 25,940	$ 25,940
First Year Operating Cost	$ 82,391	$108,128	$ 78,684	$ 76,738
Present Worth of Net Cash Flow	$324,024	$412,607	$315,955	$309,377
Rate of Return		N/C	7.84	12.12
Total Source Energy Consumption (MMBTU)	10,823	15,978	10,657	10,126

TABLE 4-8

NEW YORK

SUMMARY OF ECONOMIC COMPARISONS

ECONOMY MOTEL

Category 2a Case No. 5

SYSTEM TITLES:

A-1 Electric motor reciprocating compressor chiller with gas fired hot water boiler

A-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

A-5 Gas Heat Pump -- Mechanically Coupled version

A-6 Gas Heat Pump -- Electrically Coupled version

ANNUAL OPERATING COSTS:

Alternative Systems	A-1	A-2	A-5	A-6
Initial Investment	$315,000	$326,000	$345,868	$345,868
Natural Gas - Annual	$ 17,319	0	$ 30,829	$ 30,739
Electricity - Annual	$ 74,168	$143,042	$ 43,098	$ 39,955
	$ 91,487	$143,042	$ 73,927	$ 70,694
Maintenance - Annual	$ 6,500	$ 7,300	$ 7,300	$ 7,300
Insurance - Annual (1.0%)	$ 3,150	$ 3,260	$ 3,459	$ 3,459
Ad Valorem Tax - Annual	$ 3,150	$ 3,260	$ 3,459	$ 3,459
First Year Interest (10.0%)	$ 23,625	$ 24,450	$ 25,940	$ 25,940
First Year Operating Cost	$127,912	$181,312	$114,085	$110,852
Present Worth of Net Cash Flow	$477,887	$659,972	$435,612	$424,684
Rate of Return		N/C	27.75	33.59
Total Source Energy Consumption (MMBTU)	9,904	13,905	10,088	9,542

TABLE 4-9

DALLAS

SUMMARY OF ECONOMIC COMPARISONS

ECONOMY MOTEL

Category 2a Case No. 7

SYSTEM TITLES:

A-1 Electric motor reciprocating compressor chiller with gas fired hot water boiler

A-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

A-5 Gas Heat Pump -- Mechanically Coupled version

A-6 Gas Heat Pump -- Electrically Coupled version

ANNUAL OPERATING COSTS:

Alternative Systems	A-1	A-2	A-5	A-6
Initial Investment	$315,000	$326,000	$345,868	$345,868
Natural Gas - Annual	$ 11,180	0	$ 20,264	$ 20,204
Electricity - Annual	$ 33,865	$ 66,735	$ 18,439	$ 16,624
	$ 45,045	$ 66,735	$ 38,703	$ 36,828
Maintenance - Annual	$ 6,500	$ 7,300	$ 7,300	$ 7,300
Insurance - Annual (1.0%)	$ 3,150	$ 3,260	$ 3,459	$ 3,459
Ad Valorem Tax - Annual	$ 3,150	$ 3,260	$ 3,459	$ 3,459
First Year Interest (10.0%)	$ 23,625	$ 24,450	$ 25,940	$ 25,940
First Year Operating Cost	$ 81,470	$105,005	$ 78,861	$ 76,986
Present Worth of Net Cash Flow	$320,911	$402,050	$316,553	$310,215
Rate of Return		N/C	5.17	9.60
Total Source Energy Consumption (MMBTU)	9745	11,722	11,181	10,707

TABLE 4-10

LOS ANGELES
SUMMARY OF ECONOMIC COMPARISONS

ECONOMY MOTEL

Category 2a Case No. 9

SYSTEM TITLES:
- A-1 Electric motor reciprocating compressor chiller with gas fired hot water boiler
- A-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler
- A-5 Gas Heat Pump -- Mechanically Coupled version
- A-6 Gas Heat Pump -- Electrically Coupled version

ANNUAL OPERATING COSTS:

Alternative Systems	A-1	A-2	A-5	A-6
Initial Investment	$315,000	$326,000	$345,868	$345,868
Natural Gas - Annual	$ 9,480	0	$ 17,179	$ 17,128
Electricity - Annual	$ 33,129	$ 67,203	$ 20,967	$ 19,587
	$ 42,609	$ 67,203	$ [illegible]	$ 36,715
Maintenance - Annual	$ 6,500	$ 7,300	$ 7,300	$ 7,300
Insurance - Annual (1.0%)	$ 3,150	$ 3,260	$ 3,459	$ 3,459
Ad Valorem Tax - Annual	$ 3,150	$ 3,260	$ 3,459	$ 3,459
First Year Interest (10.0%)	$ 23,625	$ 24,450	$ 25,940	$ 25,940
First Year Operating Cost	$ 79,034	$105,473	$ 78,304	$ 76,873
Present Worth of Net Cash Flow	$312,677	$403,632	$314,670	$309,834
Rate of Return		N/C	-0.20	4.01
Total Source Energy Consumption (MMBTU)	8248	9029	9564	9055

TABLE 4-11

CHICAGO

SUMMARY OF ECONOMIC COMPARISONS

ECONOMY MOTEL

Category 4a Case No. 32

SYSTEM TITLES:

A-1 Electric motor reciprocating compressor chiller with gas fired hot water boiler

A-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

A-5 Gas Heat Pump -- Mechanically Coupled version

A-6 Gas Heat Pump -- Electrically Coupled version

ANNUAL OPERATING COSTS:

Alternative Systems	A-1	A-2	A-5	A-6
Initial Investment	$315,000	$326,000	$345,868	$345,868
Natural Gas - Annual	$ 16,682	0	$ 32,970	$ 52,810
Electricity - Annual	$ 60,980	$ 76,704	$ 21,252	$ 19,156
	$ 77,662	$ 76,704	$ 54,222	$ 71,9[illegible]
Maintenance - Annual	$ 6,500	$ 7,300	$ 7,300	$ 7,300
Insurance - Annual (1.0%)	$ 3,150	$ 3,260	$ 3,459	$ 3,459
Ad Valorem Tax - Annual	$ 3,150	$ 3,260	$ 3,459	$ 3,459
First Year Interest (10.0%)	$ 23,625	$ 24,450	$ 25,940	$ 25,940
First Year Operating Cost	$ 114,087	$ 114,974	$ 94,380	$ 112,124
Present Worth of Net Cash Flow	$431,158	$435,746	$369,008	$428,984
Rate of Return		N/C	38.31	3.48
Total Source Energy Consumption (MMBTU)	11,450	17,784	11,068	10,539

TABLE 4-12

CLEVELAND

SUMMARY OF ECONOMIC COMPARISONS

ECONOMY MOTEL

Category 4a Case No. 33

SYSTEM TITLES:

A-1 Electric motor reciprocating compressor chiller with gas fired hot water boiler

A-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

A-5 Gas Heat Pump -- Mechanically Coupled version

A-6 Gas Heat Pump -- Electrically Coupled version

ANNUAL OPERATING COSTS:

Alternative Systems	A-1	A-2	A-5	A-6
Initial Investment	$315,000	$326,000	$345,868	$345,868
Natural Gas - Annual	$ 18,183	0	$ 32,970	$ 52,810
Electricity - Annual	$ 38,849	$ 76,704	$ 21,252	$ 19,156
	$ 57,032	$ 76,704	$ 54,222	$ 71,9[illegible]
Maintenance - Annual	$ 6,500	$ 7,300	$ 7,300	$ 7,300
Insurance - Annual (1.0%)	$ 3,150	$ 3,260	$ 3,459	$ 3,459
Ad Valorem Tax - Annual	$ 3,150	$ 3,260	$ 3,459	$ 3,459
First Year Interest (10.0%)	$ 23,625	$ 24,450	$ 25,940	$ 25,940
First Year Operating Cost	$ 93,457	$114,974	$ 93,982	$112,124
Present Worth of Net Cash Flow	$361,427	$435,746	$369,008	$428,984
Rate of Return		N/C	-6.98	N/C
Total Source Energy Consumption (MMBTU)	10,823	15,978	10,657	10,126

TABLE 4-13

NEW YORK

SUMMARY OF ECONOMIC COMPARISONS

ECONOMY MOTEL

Category 4a Case No. 34

SYSTEM TITLES:

A-1 Electric motor reciprocating compressor chiller with gas fired hot water boiler

A-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

A-5 Gas Heat Pump -- Mechanically Coupled version

A-6 Gas Heat Pump -- Electrically Coupled version

ANNUAL OPERATING COSTS:

Alternative Systems	A-1	A-2	A-5	A-6
Initial Investment	$315,000	$326,000	$345,868	$345,868
Natural Gas - Annual	$ 19,484	0	$ 34,683	$ 34,581
Electricity - Annual	$ 69,421 $ 88,905	$133,887 $133,357	$ 40,340 $ 75,023	$ 37,398 $ 71,979
Maintenance - Annual	$ 6,500	$ 7,300	$ 7,300	$ 7,300
Insurance - Annual (1.0%)	$ 3,150	$ 3,260	$ 3,459	$ 3,459
Ad Valorem Tax - Annual	$ 3,150	$ 3,260	$ 3,459	$ 3,459
First Year Interest (10.0%)	$ 23,625	$ 24,450	$ 25,940	$ 25,940
First Year Operating Cost	$125,330	$172,157	$114,783	$112,137
Present Worth of Net Cash Flow	$469,160	$629,028	$439,316	$429,028
Rate of Return		N/C	20.97	26.61
Total Source Energy Consumption (MMBTU)	9,904	13,905	10,088	9,542

TABLE 4-14

DALLAS

SUMMARY OF ECONOMIC COMPARISONS

ECONOMY MOTEL

Category 4a Case No. 35

SYSTEM TITLES:

A-1 Electric motor reciprocating compressor chiller with gas fired hot water boiler

A-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

A-5 Gas Heat Pump -- Mechanically Coupled version

A-6 Gas Heat Pump -- Electrically Coupled version

ANNUAL OPERATING COSTS:

Alternative Systems	A-1	A-2	A-5	A-6
Initial Investment	$315,000	$326,000	$345,868	$345,868
Natural Gas - Annual	$ 18,503	0	$ 33,537	$ 33,428
Electricity - Annual	$ 43,042 $ 61,545	$ 84,820 $ 84,820	$ 23,436 $ 56,973	$ 21,129 $ 54,557
Maintenance - Annual	$ 6,500	$ 7,300	$ 7,300	$ 7,300
Insurance - Annual (1.0%)	$ 3,150	$ 3,260	$ 3,459	$ 3,459
Ad Valorem Tax - Annual	$ 3,150	$ 3,260	$ 3,459	$ 3,459
First Year Interest (10.0%)	$ 23,625	$ 24,450	$ 25,940	$ 25,940
First Year Operating Cost	$ 97,970	$123,090	$ 97,131	$ 94,715
Present Worth of Net Cash Flow	$376,682	$463,179	$378,306	$370,140
Rate of Return		N/C	0.16	6.77
Total Source Energy Consumption (MMBTU)	9,745	11,722	11,181	10,707

TABLE 4-15

LOS ANGELES
SUMMARY OF ECONOMIC COMPARISONS
ECONOMY MOTEL

Category 4a Case No. 36

SYSTEM TITLES:
- A-1 Electric motor reciprocating compressor chiller with gas fired hot water boiler
- A-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler
- A-5 Gas Heat Pump -- Mechanically Coupled version
- A-6 Gas Heat Pump -- Electrically Coupled version

ANNUAL OPERATING COSTS:

Alternative Systems	A-1	A-2	A-5	A-6
Initial Investment	$315,000	$326,000	$345,868	$345,868
Natural Gas - Annual	$ 14,931	0	$ 27,057	$ 26,977
Electricity - Annual	$ 35,846	$ 72,714	$ 22,686	$ 21,193
	$ 50,777	$ 72,714	$ 49,743	$ 48,170
Maintenance - Annual	$ 6,500	$ 7,300	$ 7,300	$ 7,300
Insurance - Annual (1.0%)	$ 3,150	$ 3,260	$ 3,459	$ 3,459
Ad Valorem Tax - Annual	$ 3,150	$ 3,260	$ 3,459	$ 3,459
First Year Interest (10.0%)	$ 23,625	$ 24,450	$ 25,940	$ 25,940
First Year Operating Cost	$ 87,202	$110,934	$ 89,901	$ 88,328
Present Worth of Net Cash Flow	$340,285	$422,260	$353,869	$348,552
Rate of Return		N/C	N/C	-8.14
Total Source Energy Consumption (MMBTU)	8,248	9,029	9,564	9,055

TABLE 4-16

CHICAGO

SUMMARY OF ECONOMIC COMPARISONS

ECONOMY MOTEL

Category 4 b Case No. 37

SYSTEM TITLES:

A-1 Electric motor reciprocating compressor chiller with gas fired hot water boiler

A-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

A-5 Gas Heat Pump -- Mechanically Coupled version

A-6 Gas Heat Pump -- Electrically Coupled version

ANNUAL OPERATING COSTS:

Alternative Systems	A-1	A-2	A-5	A-6
Initial Investment	$315,000	$326,000	$345,868	$345,868
Natural Gas - Annual	$ 12,065	0	$ 21,926	$ 21,860
Electricity - Annual	$ 41,110 $ 53,175	$ 80,371 $ 80,37	$ 20,014 $ 41,940	$ 20,933 $ 42,793
Maintenance - Annual	$ 6,500	$ 7,300	$ 7,300	$ 7,300
Insurance - Annual (1.0%)	$ 3,150	$ 3,260	$ 3,459	$ 3,459
Ad Valorem Tax - Annual	$ 3,150	$ 3,260	$ 3,459	$ 3,459
First Year Interest (10.0%)	$ 23,625	$ 24,450	$ 25,940	$ 25,940
First Year Operating Cost	$101,665	$118,641	$ 82,098	$ 82,951
Present Worth of Net Cash Flow	$348,391	$448,141	$327,494	$330,378
Rate of Return		N/C	15.88	14.17
Total Source Energy Consumption (MMBTU)	11,450	17,784	11,068	10,539

TABLE 4-17

CLEVELAND

SUMMARY OF ECONOMIC COMPARISONS

ECONOMY MOTEL

Category 4b Case No. 38

SYSTEM TITLES:

A-1 Electric motor reciprocating compressor chiller with gas fired hot water boiler

A-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

A-5 Gas Heat Pump -- Mechanically Coupled version

A-6 Gas Heat Pump -- Electrically Coupled version

ANNUAL OPERATING COSTS:

Alternative Systems	A-1	A-2	A-5	A-6
Initial Investment	$315,000	$326,000	$345,868	$345,868
Natural Gas - Annual	$ 11,367	0	$ 20,611	$ 20,550
Electricity - Annual	$ 38,213	$ 75,447	$ 20,903	$ 18,842
	$ 49,580	$ 75,447	$ 41,514	$ 39,392
Maintenance - Annual	$ 6,500	$ 7,300	$ 7,300	$ 7,300
Insurance - Annual (1.0%)	$ 3,150	$ 3,260	$ 3,459	$ 3,459
Ad Valorem Tax - Annual	$ 3,150	$ 3,260	$ 3,459	$ 3,459
First Year Interest (10.0%)	$ 23,625	$ 24,450	$ 25,940	$ 25,940
First Year Operating Cost	$ 86,005	$113,711	$ 61,061	$ 79,550
Present Worth of Net Cash Flow	$336,239	$431,497	$326,054	$318,882
Rate of Return		N/C	9.27	13.78
Total Source Energy Consumption (MMBTU)	10,823	15,978	10,657	10,126

TABLE 4-18

NEW YORK

SUMMARY OF ECONOMIC COMPARISONS

ECONOMY MOTEL

Category 4b Case No. 39

SYSTEM TITLES:

A-1 Electric motor reciprocating compressor chiller with gas fired hot water boiler

A-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

A-5 Gas Heat Pump -- Mechanically Coupled version

A-6 Gas Heat Pump -- Electrically Coupled version

ANNUAL OPERATING COSTS:

Alternative Systems	A-1	A-2	A-5	A-6
Initial Investment	$315,000	$326,000	$345,868	$345,868
Natural Gas - Annual	$ 16,973	0	$ 30,212	$ 30,124
Electricity - Annual	$ 73,500 $ 90,473	$141,755 $ 141,755	$ 42,710 $ 72,922	$ 39,595 $ 69,719
Maintenance - Annual	$ 6,500	$ 7,300	$ 7,300	$ 7,300
Insurance - Annual (1.0%)	$ 3,150	$ 3,260	$ 3,459	$ 3,459
Ad Valorem Tax - Annual	$ 3,150	$ 3,260	$ 3,459	$ 3,459
First Year Interest (100%)	$ 23,625	$ 24,450	$ 25,940	$ 25,940
First Year Operating Cost	$126,898	$180,025	$113,080	$109,877
Present Worth of Net Cash Flow	$474,460	$655,622	$432,215	$421,389
Rate of Return		N/C	27.74	33.51
Total Source Energy Consumption (MMBTU)	9,904	13,905	10,088	9,542

TABLE 4-19

DALLAS

SUMMARY OF ECONOMIC COMPARISONS

ECONOMY MOTEL

Category 4 b Case No. 40

SYSTEM TITLES:

A-1 Electric motor reciprocating compressor chiller with gas fired hot water boiler

A-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

A-5 Gas Heat Pump -- Mechanically Coupled version

A-6 Gas Heat Pump -- Electrically Coupled version

ANNUAL OPERATING COSTS:

Alternative Systems	A-1	A-2	A-5	A-6
Initial Investment	$315,000	$326,000	$345,868	$345,868
Natural Gas - Annual	$ 14,422	0	$ 26,141	$ 26,063
Electricity - Annual	$ 38,369 $ 52,791	$ 75,611 $ 75,61[illegible]	$ 20,891 $ 47,032	$ 18,135 $ 44,[illegible]93
Maintenance - Annual	$ 6,500	$ 7,300	$ 7,300	$ 7,300
Insurance - Annual (1.0%)	$ 3,150	$ 3,260	$ 3,459	$ 3,459
Ad Valorem Tax - Annual	$ 3,150	$ 3,260	$ 3,459	$ 3,459
First Year Interest (10.0%)	$ 23,625	$ 24,450	$ 25,940	$ 25,940
First Year Operating Cost	$ 89,216	$113,881	$ 87,190	$ 84,356
Present Worth of Net Cash Flow	$347,093	$432,052	$344,705	$339,126
Rate of Return		N/C	3.65	10.43
Total Source Energy Consumption (MMBTU)	9,745	11,722	11,181	10,707

TABLE 4-20

LOS ANGELES
SUMMARY OF ECONOMIC COMPARISONS

ECONOMY MOTEL

Category 4b Case No. 4-1

SYSTEM TITLES: A-1 Electric motor reciprocating compressor chiller with gas fired hot water boiler

A-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

A-5 Gas Heat Pump -- Mechanically Coupled version

A-6 Gas Heat Pump -- Electrically Coupled version

ANNUAL OPERATING COSTS:

Alternative Systems	A-1	A-2	A-5	A-6
Initial Investment	$315,000	$326,000	$345,868	$345,868
Natural Gas - Annual	$ 10.248	0	$ 18,570	$ 18,515
Electricity - Annual	$ 35,249	$ 71,504	$ 22,309	$ 20,841
	$ 45,498	$ 71,504	$ 40,879	$ 39,356
Maintenance - Annual	$ 6,500	$ 7,300	$ 7,300	$ 7,300
Insurance - Annual (1.0%)	$ 3,150	$ 3,260	$ 3,459	$ 3,459
Ad Valorem Tax - Annual	$ 3,150	$ 3,260	$ 3,459	$ 3,459
First Year Interest (100%)	$ 23,625	$ 24,450	$ 25,940	$ 25,940
First Year Operating Cost	$ 81,922	$109,774	$ 81,037	$ 84,356
Present Worth of Net Cash Flow	$322,439	$418,170	$323,908	$318,760
Rate of Return		N/C	0.31	4.66
Total Source Energy Consumption (MMBTU)	8,248	9,029	9,564	9,055

TABLE 4-21

CHICAGO
SUMMARY OF ECONOMIC COMPARISONS

ECONOMY MOTEL

Category 4c Case No. 42

SYSTEM TITLES:
- A-1 Electric motor reciprocating compressor chiller with gas fired hot water boiler
- A-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler
- A-5 Gas Heat Pump -- Mechanically Coupled version
- A-6 Gas Heat Pump -- Electrically Coupled version

ANNUAL OPERATING COSTS:

Alternative Systems	A-1	A-2	A-5	A-6
Initial Investment	$315,000	$326,000	$345,868	$345,868
Natural Gas - Annual	$ 11,234	0	$ 20,415	$ 20,354
Electricity - Annual	$ 37,333 $ 48,567	$ 75,079 $ 75,079	$ 20,313 $ 40,728	$ 18,320 $ 38,674
Maintenance - Annual	$ 6,500	$ 7,300	$ 7,300	$ 7,300
Insurance - Annual (1.0%)	$ 3,150	$ 3,260	$ 3,459	$ 3,459
Ad Valorem Tax - Annual	$ 3,150	$ 3,260	$ 3,459	$ 3,459
First Year Interest (10.0%)	$ 23,625	$ 24,450	$ 25,940	$ 25,940
First Year Operating Cost	$ 84,992	$113,349	$ 80,886	$ 78,832
Present Worth of Net Cash Flow	$332,815	$430,254	$323,397	$316,455
Rate of Return		N/C	8.76	13.17
Total Source Energy Consumption (MMBTU)	11,450	17,784	11,068	10,539

TABLE 4-22

NEW YORK

SUMMARY OF ECONOMIC COMPARISONS

ECONOMY MOTEL

Category 4c Case No. 43

SYSTEM TITLES:

A-1 Electric motor reciprocating compressor chiller with gas fired hot water boiler

A-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

A-5 Gas Heat Pump -- Mechanically Coupled version

A-6 Gas Heat Pump -- Electrically Coupled version

ANNUAL OPERATING COSTS:

Alternative Systems	A-1	A-2	A-5	A-6
Initial Investment	$315,000	$326,000	$345,868	$345,868
Natural Gas - Annual	$ 17,319	0	$ 30,829	$ 30,719
Electricity - Annual	~~$ 82,035~~ $ 79	~~$147,700~~ $147,750	~~$ 42,818~~ $ 73,647	~~$ 40,319~~ $ 71,038
Maintenance - Annual	$ 6,500	$ 7,300	$ 7,300	$ 7,300
Insurance - Annual (1.0%)	$ 3,150	$ 3,260	$ 3,459	$ 3,459
Ad Valorem Tax - Annual	$ 3,150	$ 3,260	$ 3,459	$ 3,459
First Year Interest (10.0%)	$ 23,625	$ 24,450	$ 25,940	$ 25,940
First Year Operating Cost	$135,779	$185,970	$113,805	$111,196
Present Worth of Net Cash Flow	$504,478	$675,717	$434,665	$425,847
Rate of Return		N/C	42.33	46.97
Total Source Energy Consumption (MMBTU)	9,904	13,905	10,088	9,542

TABLE 4-23

LOS ANGELES
SUMMARY OF ECONOMIC COMPARISONS

ECONOMY MOTEL

Category 4C Case No. 44

SYSTEM TITLES: A-1 Electric motor reciprocating compressor chiller with gas fired hot water boiler

A-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

A-5 Gas Heat Pump -- Mechanically Coupled version

A-6 Gas Heat Pump -- Electrically Coupled version

ANNUAL OPERATING COSTS:

Alternative Systems	A-1	A-2	A-5	A-6
Initial Investment	$315,000	$326,000	$345,868	$345,868
Natural Gas - Annual	$ 9,480	0	$ 17,179	$ 17,178
Electricity - Annual	$ 31,459 $ 40,939	$ 67,833 $ 67,833	$ 17,177 $ 34,356	$ 15,727 $ 32,905
Maintenance - Annual	$ 6,500	$ 7,300	$ 7,300	$ 7,300
Insurance - Annual (1.0%)	$ 3,150	$ 3,260	$ 3,459	$ 3,459
Ad Valorem Tax - Annual	$ 3,150	$ 3,260	$ 3,459	$ 3,459
First Year Interest (10.0%)	$ 23,625	$ 24,450	$ 25,940	$ 25,940
First Year Operating Cost	$ 77,364	$106,103	$ 74,514	$ 73,063
Present Worth of Net Cash Flow	$307,032	$405,762	$301,860	$296,955
Rate of Return		N/C	5.78	9.20
Total Source Energy Consumption (MMBTU)	8,248	9,029	9,564	9,055

TABLE 4-24

CHICAGO

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 1b Case No. 10

SYSTEM TITLES:

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

B-3 Electric motor heat pump connected with a closed water loop

B-4 Gas Heat Pump - Mechanically coupled version

B-5 Gas Heat Pump - Electrically coupled version

ANNUAL OPERATING COSTS: Least expensive system is B-1 base system

Alternative Systems	B-1	B-2	B-3	B-4	B-5
Initial investment	$235,065	$315,500	$259,000	$330,041	$330,041
Natural Gas - Annual	$7,154	0	0	$15,663	$15,594
Electricity - Annual	$42,168 49,322	$66,725 66,725	$65,224 65,224	$29,972 45,635	$23,343 43,037
Maintenance - Annual	$6,500	$7,300	$6,300	$7,300	$7,300
Insurance - Annual (1.0%)	$2,351	$3,155	$2,590	$3,300	$3,300
Ad Valorem Tax - Annual	$2,351	$3,155	$2,590	$3,300	$3,300
First Year Interest (10 %)	$17,630	$23,622	$19,425	$24,753	$24,753
First Year Operating cost	$78,630	$103,957	$96,129	$84,288	$82,540
Present Worth of Net Cash Flow	$298,144	$394,822	$362,363	$332,613	$326,705
Rate of Return		N/C	N/C	N/C	N/C
Total Source energy consumption (MMBTU)	5067	8552	7369	5820	5321

TABLE 4-25

CLEVELAND

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 1b Case No. 12

SYSTEM TITLES:

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

B-3 Electric motor heat pump connected with a closed water loop

B-4 Gas Heat Pump - Mechanically coupled version

B-5 Gas Heat Pump - Electrically coupled version

ANNUAL OPERATING COSTS: Least expensive system is B-1 base system

Alternative Systems	B-1	B-2	B-3	B-4	B-5
Initial investment	$235,065	$315,500	$259,000	$330,041	$330,041
Natural Gas - Annual	$6,094	0	0	$14,328	$14,264
Electricity - Annual	$38,857	$59,526	$57,392	$27,164	$25,437
	44,951	59,526	57,392	41,492	39,701
Maintenance - Annual	$6,500	$7,300	$6,300	$7,300	$7,300
Insurance - Annual (1.0%)	$2,351	$3,155	$2,590	$3,300	$3,300
Ad Valorem Tax - Annual	$2,351	$3,155	$2,590	$3,300	$3,300
First Year Interest (10 %)	$17,630	$23622	$19,425	$24,753	$24,753
First Year Operating cost	$73,783	$96,758	$88,297	$80,145	$78,354
Present Worth of Net Cash Flow	$283,370	$373,142	$335,841	$318,610	$312,556
Rate of Return		N/C	N/C	N/C	N/C
Total Source energy consumption (MMBTU)	4722	7731	6624	5642	5144

TABLE 4-26

NEW YORK

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 1b Case No. 13

SYSTEM TITLES:

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

B-3 Electric motor heat pump connected with a closed water loop

B-4 Gas Heat Pump - Mechanically coupled version

B-5 Gas Heat Pump - Electrically coupled version

ANNUAL OPERATING COSTS: Least expensive system is B-1 base system

Alternative Systems	B-1	B-2	B-3	B-4	B-5
Initial investment	$235,065	$315,500	$259,000	$330,041	$330,041
Natural Gas - Annual	$8,822	0	0	$23,151	$23,047
Electricity - Annual	$85,335 94,157	$118,603 118,603	$115,741 115,741	$61,998 85,149	$59,277 82,329
Maintenance - Annual	$6,500	$7,300	$6,300	$7,300	$7,300
Insurance - Annual (1.0%)	$2,351	$3,155	$2,590	$3,300	$3,300
Ad Valorem Tax - Annual	$2,351	$3,155	$2,590	$3,300	$3,300
First Year Interest (10%)	$17,360	$23,622	$19,425	$24,753	$24,753
First Year Operating cost	$122,989	$155,835	$146,646	$123,808	$129,977
Present Worth of Net Cash Flow	$449,688	$572,478	$533,114	$466,173	$456,624
Rate of Return		N/C	N/C	-3.87%	-0.45%
Total Source energy consumption (MMBTU)	4377	6873	5679	5616	5132

TABLE 4-27

DALLAS

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 1b Case No. 15

SYSTEM TITLES:

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

B-3 Electric motor heat pump connected with a closed water loop

B-4 Gas Heat Pump - Mechanically coupled version

B-5 Gas Heat Pump - Electrically coupled version

ANNUAL OPERATING COSTS: Least expensive system is B-1 base system

Alternative Systems	B-1	B-2	B-3	B-4	B-5
Initial investment	$235,065	$315,500	$259,000	$330,041	$330,041
Natural Gas - Annual	$3,209	0	0	$13,737	$22,543
Electricity - Annual	$35,711 38,920	$43,728 43,728	$43,516 43,516	$23,798 37,935	$13,657 26,200
Maintenance - Annual	$6,500	$7,300	$6,300	$7,300	$7,300
Insurance - Annual (1.0%)	$2,351	$3,155	$2,590	$3,300	$3,300
Ad Valorem Tax - Annual	$2,351	$3,155	$2,590	$3,300	$3,300
First Year Interest (10%)	$17,630	$23,622	$19,425	$24,753	$24,753
First Year Operating cost	$67,752	$80,360	$74,421	$76,188	$74,053
Present Worth of Net Cash Flow	$262,985	$319,396	$288,989	$305,235	$300,722
Rate of Return		N/C	N/C	N/C	N/C
Total Source energy consumption (MMBTU)	4111	5393	4709	5931	5531

TABLE 4-28

LOS ANGELES

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 1b Case No. 17

SYSTEM TITLES:

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

B-3 Electric motor heat pump connected with a closed water loop

B-4 Gas Heat Pump - Mechanically coupled version

B-5 Gas Heat Pump - Electrically coupled version

ANNUAL OPERATING COSTS: Least expensive system is B-1 base system

Alternative Systems	B-1	B-2	B-3	B-4	B-5
Initial investment	$235,065	$315,500	$259,000	$330,041	$330,041
Natural Gas - Annual	$2,849	0	0	$12,576	$12,483
Electricity - Annual	$40,550 43,399	$49,073 49,073	$49,701 49,701	$28,275 40,851	$27,150 39,633
Maintenance - Annual	$6,500	$7,300	$6,300	$7,300	$7,300
Insurance - Annual (1.0%)	$2,351	$3,155	$2,590	$3,300	$3,300
Ad Valorem Tax - Annual	$2,351	$3,155	$2,590	$3,300	$3,300
First Year Interest (10%)	$17,630	$23,622	$19,425	$24,753	$24,753
First Year Operating cost	$72,231	$86,305	$80,606	$79,504	$78,286
Present Worth of Net Cash Flow	$278,124	$337,462	$309,895	$316,443	$312,326
Rate of Return		N/C	N/C	N/C	N/C
Total Source energy consumption (MMBTU)	3912	5402	4858	5859	5376

TABLE 4-29

CHICAGO

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 2b Case No. 11

SYSTEM TITLES:

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

B-3 Electric motor heat pump connected with a closed water loop

B-4 Gas Heat Pump - Mechanically coupled version

B-5 Gas Heat Pump - Electrically coupled version

ANNUAL OPERATING COSTS: Least expensive system is B-1 base system

Alternative Systems	B-1	B-2	B-3	B-4	B-5
Initial investment	$235,065	$315,500	$259,000	$330,041	$330,041
Natural Gas - Annual	$6,444	0	0	$15,228	$15,159
Electricity - Annual	$41,929 48,373	$64,072 64,072	$62,316 62,316	$29,786 45,014	$28,145 43,304
Maintenance - Annual	$6,500	$7,300	$6,300	$7,300	$7,300
Insurance - Annual (1.0%)	$2,351	$3,155	$2,590	$3,300	$3,300
Ad Valorem Tax - Annual	$2,351	$3,155	$2,590	$3,300	$3,300
First Year Interest (10%)	$17,630	$23,622	$19,425	$24,753	$24,753
First Year Operating cost	$77,565	$101,304	$93,221	$83,667	$81,957
Present Worth of Net Cash Flow	$294,936	$388,160	$352,534	$330,514	$324,734
Rate of Return		N/C	N/C	N/C	N/C
Total Source energy consumption (MMBTU)	5057	8552	7369	5820	5321

TABLE 4-30

CLEVELAND

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 2b Case No. 12

SYSTEM TITLES:

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

B-3 Electric motor heat pump connected with a closed water loop

B-4 Gas Heat Pump - Mechanically coupled version

B-5 Gas Heat Pump - Electrically coupled version

ANNUAL OPERATING COSTS: Least expensive system is B-1 base system

Alternative Systems	B-1	B-2	B-3	B-4	B-5
Initial investment	$235,065	$315,500	$259,000	$330,041	$330,041
Natural Gas - Annual	$6,094	0	0	$14,328	$14,264
Electricity - Annual	$38,857	$59,629	$57,392	$27,164	$25,437
	44,951	59,629	57,392	41,492	39,701
Maintenance - Annual	$6,500	$7,300	$6,300	$7,300	$7,300
Insurance - Annual (1.0%)	$2,351	$3,155	$2,590	$3,300	$3,300
Ad Valorem Tax - Annual	$2,351	$3,155	$2,590	$3,300	$3,300
First Year Interest (10 %)	$17,630	$23,622	$19,425	$24,753	$24,753
First Year Operating cost	$74,143	$96,861	$88,297	$80,145	$78,354
Present Worth of Net Cash Flow	$283,370	$373,142	$335,891	$318,610	$312,256
Rate of Return		N/C	N/C	N/C	N/C
Total Source energy consumption (MMBTU)	4722	7731	6624	5642	5144

TABLE 4-31

NEW YORK

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 2b Case No. 14

SYSTEM TITLES:

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

B-3 Electric motor heat pump connected with a closed water loop

B-4 Gas Heat Pump - Mechanically coupled version

B-5 Gas Heat Pump - Electrically coupled version

ANNUAL OPERATING COSTS: Least expensive system is B-1 base system

Alternative Systems	B-1	B-2	B-3	B-4	B-5
Initial investment	$235,065	$315,500	$259,000	$330,041	$330,041
Natural Gas - Annual	$10,404	0	0	$23,639	$23,535
Electricity - Annual	$84,148 94,552	$125,661 125,661	$124,116 124,116	$60,891 84,530	$58,094 81,629
Maintenance - Annual	$6,500	$7,300	$6,300	$7,300	$7,300
Insurance - Annual (1.0%)	$2,351	$3,155	$2,590	$3,300	$3,300
Ad Valorem Tax - Annual	$2,351	$3,155	$2,590	$3,300	$3,300
First Year Interest (10 %)	$17,630	$23,622	$19,425	$24,753	$24,753
First Year Operating cost	$123,744	$162,893	$155,021	$123,183	$120,282
Present Worth of Net Cash Flow	$451,023	$596,334	$561,422	$464,080	$454,275
Rate of Return		N/C	N/C	-2.55%	0.69%
Total Source energy consumption (MMBTU)	4377	6873	5679	5616	5132

TABLE 4-32

DALLAS

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 2b Case No. 16

SYSTEM TITLES:

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

B-3 Electric motor heat pump connected with a closed water loop

B-4 Gas Heat Pump - Mechanically coupled version

B-5 Gas Heat Pump - Electrically coupled version

ANNUAL OPERATING COSTS: Least expensive system is B-1 base system

Alternative Systems	B-1	B-2	B-3	B-4	B-5
Initial investment	$235,065	$315,500	$259,000	$330,041	$330,041
Natural Gas - Annual	$6,445	0	0	$15,137	$15,070
Electricity - Annual	$38,058	$58,022	$57,385	$26,196	$24,532
	44,503	58,022	57,385	41,333	39,602
Maintenance - Annual	$6,500	$7,300	$6,300	$7,300	$7,300
Insurance - Annual (1.0%)	$2,351	$3,155	$2,590	$3,300	$3,300
Ad Valorem Tax - Annual	$2,351	$3,155	$2,590	$3,300	$3,300
First Year Interest (10 %)	$17,630	$23,622	$19,425	$24,753	$24,753
First Year Operating cost	$73,695	$95,254	$88,290	$79,986	78,255
Present Worth of Net Cash Flow	$281,855	$367,711	$335,867	$318,072	$312,221
Rate of Return		N/C	N/C	N/C	N/C
Total Source energy consumption (MMBTU)	4111	5393	4709	5931	5531

TABLE 4-33

LOS ANGELES

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 2b Case No. 18

SYSTEM TITLES:

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

B-3 Electric motor heat pump connected with a closed water loop

B-4 Gas Heat Pump - Mechanically coupled version

B-5 Gas Heat Pump - Electrically coupled version

ANNUAL OPERATING COSTS: Least expensive system is B-1 base system

Alternative Systems	B-1	B-2	B-3	B-4	B-5
Initial investment	$235,065	$315,500	$259,000	$330,041	$330,041
Natural Gas - Annual	$5,462	0	0	$12,829	$12,771
Electricity - Annual	$36,412	$57,000	$55,865	$26,460	$25,222
	41,874	57,000	55,865	39,289	37,993
Maintenance - Annual	$6,500	$7,300	$6,300	$7,300	$7,300
Insurance - Annual (1.0%)	$2,351	$3,155	$2,590	$3,300	$3,300
Ad Valorem Tax - Annual	$2,351	$3,155	$2,590	$3,300	$3,300
First Year Interest (10%)	$17,630	$23,622	$19,425	$24,753	$24,753
First Year Operating cost	$71,066	$94,232	$86,770	$77,942	$76,646
Present Worth of Net Cash Flow	$272,469	$364,256	$330,730	$311,163	$306,783
Rate of Return		N/C	N/C	N/C	N/C
Total Source energy consumption (MMBTU)	3912	5402	4858	5859	5376

TABLE 4-34

CHICAGO

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 3a DOE Case No. 19

SYSTEM TITLES:

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

B-3 Electric motor heat pump connected with a closed water loop

B-4 Gas Heat Pump - Mechanically coupled version

B-5 Gas Heat Pump - Electrically coupled version

ANNUAL OPERATING COSTS: Least expensive system is B-1 base system

Alternative Systems	B-1	B-2	B-3	B-4	B-5
Initial investment	$235,065	$315,500	$259,000	$330,041	$330,041
Natural Gas - Annual	$9,569	0	0	$22,614	$22,511
Electricity - Annual	$44,529 54,098	$68,044 68,044	$66,180 66,180	$31,633 54,247	$29,890 52,401
Maintenance - Annual	$6,500	$7,300	$6,300	$7,300	$7,300
Insurance - Annual (1.0%)	$2,351	$3,155	$2,590	$3,300	$3,300
Ad Valorem Tax - Annual	$2,351	$3,155	$2,590	$3,300	$3,300
First Year Interest (10%)	$17,630	$23,622	$19,425	$24,753	$24,753
First Year Operating cost	$83,290	$105,276	$97,085	$92,900	$91,054
Present Worth of Net Cash Flow	$314,287	$401,585	$365,595	$361,722	$355,483
Rate of Return		N/C	N/C	N/C	N/C
Total Source energy consumption (MMBTU)	5057	8552	7369	5820	5321

TABLE 4-35

CLEVELAND

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 3a DOE Case No. 20

SYSTEM TITLES:

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

B-3 Electric motor heat pump connected with a closed water loop

B-4 Gas Heat Pump - Mechanically coupled version

B-5 Gas Heat Pump - Electrically coupled version

ANNUAL OPERATING COSTS: Least expensive system is B-1 base system

Alternative Systems	B-1	B-2	B-3	B-4	B-5
Initial investment	$235,065	$315,500	$259,000	$330,041	$330,041
Natural Gas - Annual	$10,469	0	0	$24,616	$24,506
Electricity - Annual	$42,665 53,134	$65,473 65,473	$63,016 63,016	$29,826 54,842	$27,930 52,436
Maintenance - Annual	$6,500	$7,300	$6,300	$7,300	$7,300
Insurance - Annual (1.0%)	$2,351	$3,155	$2,590	$3,300	$3,300
Ad Valorem Tax - Annual	$2,351	$3,155	$2,590	$3,300	$3,300
First Year Interest (10 %)	$17,630	$23,622	$19,425	$24,753	$24,753
First Year Operating cost	$82,326	$102,705	$93,921	$93,095	$91,089
Present Worth of Net Cash Flow	$311,029	$392,895	$354,900	$362,381	$355,601
Rate of Return		N/C	N/C	N/C	N/C
Total Source energy consumption (MMBTU)	4722	7731	6624	5642	5144

TABLE 4-36

NEW YORK

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 3a DOE Case No. 21

SYSTEM TITLES:
- B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler
- B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler
- B-3 Electric motor heat pump connected with a closed water loop
- B-4 Gas Heat Pump - Mechanically coupled version
- B-5 Gas Heat Pump - Electrically coupled version

ANNUAL OPERATING COSTS: Least expensive system is B-1 base system

Alternative Systems	B-1	B-2	B-3	B-4	B-5
Initial investment	$235,065	$315,500	$259,000	$330,041	$330,041
Natural Gas - Annual	$13,005	0	0	$29,549	$29,419
Electricity - Annual	$78,762 91,767	$117,619 117,619	$116,173 116,173	$56,994 86,543	$54,376 83,795
Maintenance - Annual	$6,500	$7,300	$6,300	$7,300	$7,300
Insurance - Annual (1.0%)	$2,351	$3,155	$2,590	$3,300	$3,300
Ad Valorem Tax - Annual	$2,351	$3,155	$2,590	$3,300	$3,300
First Year Interest (10 %)	$17,360	$23,622	$19,425	$24,753	$24,753
First Year Operating cost	$120,959	$154,851	$147,078	$125,196	$122,448
Present Worth of Net Cash Flow	$441,610	$569,152	$534,574	$470,884	$461,596
Rate of Return		N/C	N/C	-10.64%	-5.36%
Total Source energy consumption (MMBTU)	4377	6873	5679	5616	5132

TABLE 4-37

DALLAS

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 3a DOE Case No. 22

SYSTEM TITLES:

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

B-3 Electric motor heat pump connected with a closed water loop

B-4 Gas Heat Pump - Mechanically coupled version

B-5 Gas Heat Pump - Electrically coupled version

ANNUAL OPERATING COSTS: Least expensive system is B-1 base system

Alternative Systems	B-1	B-2	B-3	B-4	B-5
Initial investment	$235,065	$315,500	$259,000	$330,041	$330,041
Natural Gas - Annual	$10,666	0	0	$25,051	$24,941
Electricity - Annual	$48,372 59,038	$73,746 73,746	$72,936 72,936	$33,925 56,976	$31,180 56,121
Maintenance - Annual	$6,500	$7,300	$6,300	$7,300	$7,300
Insurance - Annual (1.0%)	$2,351	$3,155	$2,590	$3,300	$3,300
Ad Valorem Tax - Annual	$2,351	$3,155	$2,590	$3,300	$3,300
First Year Interest (10 %)	$17,630	$23,622	$19,425	$24,753	$24,753
First Year Operating cost	$88,230	$110,978	$103,841	$97,629	$94,774
Present Worth of Net Cash Flow	$330,984	$420,858	$388,430	$375,577	$368,056
Rate of Return		N/C	N/C	N/C	N/C
Total Source energy consumption (MMBTU)	4111	5393	4709	5931	5531

TABLE 4-38

LOS ANGELES

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 3a DOE Case No. 23

SYSTEM TITLES:

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

B-3 Electric motor heat pump connected with a closed water loop

B-4 Gas Heat Pump - Mechanically coupled version

B-5 Gas Heat Pump - Electrically coupled version

ANNUAL OPERATING COSTS: Least expensive system is B-1 base system

Alternative Systems	B-1	B-2	B-3	B-4	B-5
Initial investment	$235,065	$315,500	$259,000	$330,041	$330,041
Natural Gas - Annual	$8,602	0	0	$20,206	$20,114
Electricity - Annual	$39,398	$61,674	$60,457	$28,629	$27,290
Maintenance - Annual	$6,500	$7,300	$6,300	$7,300	$7,300
Insurance - Annual (1.0%)	$2,351	$3,155	$2,590	$3,300	$3,300
Ad Valorem Tax - Annual	$2,351	$3,155	$2,590	$3,300	$3,300
First Year Interest (%)	$17,630	$23,622	$19,425	$24,753	$24,753
First Year Operating cost	$77,192	$98,906	$91,362	$87,488	$86,957
Present Worth of Net Cash Flow	293,675	380,054	346,251	343,429	338,592
Rate of Return		N/C	N/C	N/C	N/C
Total Source energy consumption (MMBTU)	3912	5402	4858	5859	5376

TABLE 4-39

CHICAGO

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 3b Case No. 24

SYSTEM TITLES:
- B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler
- B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler
- B-3 Electric motor heat pump connected with a closed water loop
- B-4 Gas Heat Pump - Mechanically coupled version
- B-5 Gas Heat Pump - Electrically coupled version

ANNUAL OPERATING COSTS: Least expensive system is B-1 base system

Alternative Systems	B-1	B-2	B-3	B-4	B-5
Initial investment	$235,065	$315,500	$259,000	$330,041	$330,041
Natural Gas - Annual	$6,921	0	0	$16,355	$16,280
Electricity - Annual	$48,283 55,204	$69,198 67,198	$67,301 [illegible]	$32,169 [illegible]	$30,397 [illegible]
Maintenance - Annual	$6,500	$7,300	$6,300	$7,300	$7,300
Insurance - Annual (1.0%)	$2,351	$3,155	$2,590	$3,300	$3,300
Ad Valorem Tax - Annual	$2,351	$3,155	$2,590	$3,300	$3,300
First Year Interest (10%)	$17,630	$23,622	$19,425	$24,753	$24,753
First Year Operating cost	$84,396	$106,430	$98,206	$87,177	$85,330
Present Worth of Net Cash Flow	$318,277	$405,486	$369,384	$342,378	$336,135
Rate of Return		N/C	N/C	N/C	-4.48%
Total Source energy consumption (MMBTU)	5057	8552	7369	5820	5321

TABLE 4-40

CLEVELAND

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 3b Case No. 25

SYSTEM TITLES:
- B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler
- B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler
- B-3 Electric motor heat pump connected with a closed water loop
- B-4 Gas Heat Pump - Mechanically coupled version
- B-5 Gas Heat Pump - Electrically coupled version

ANNUAL OPERATING COSTS: Least expensive system is B-1 base system

Alternative Systems	B-1	B-2	B-3	B-4	B-5
Initial investment	$235,065	$315,500	$259,000	$330,041	$330,041
Natural Gas - Annual	$6,544	0	0	$15,388	$15,320
Electricity - Annual	$41,966 48,510	$64,399 64,399	$61,983 [illegible]	$29,337 44,725	$24,472 34,772
Maintenance - Annual	$6,500	$7,300	$6,300	$7,300	$7,300
Insurance - Annual (1.0%)	$2,351	$3,155	$2,590	$3,300	$3,300
Ad Valorem Tax - Annual	$2,351	$3,155	$2,590	$3,300	$3,300
First Year Interest (10%)	$17,360	$23,622	$19,425	$24,753	$24,753
First Year Operating cost	$77,702	$101,631	$92,888	$83,378	$78,445
Present Worth of Net Cash Flow	$295,399	$389,265	$351,049	$329,537	$323,004
Rate of Return		N/C	N/C	N/C	-9.48%
Total Source energy consumption (MMBTU)	4722	7731	6624	5642	5144

TABLE 4-41

NEW YORK

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 3b Case No. 26

SYSTEM TITLES:

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

B-3 Electric motor heat pump connected with a closed water loop

B-4 Gas Heat Pump - Mechanically coupled version

B-5 Gas Heat Pump - Electrically coupled version

ANNUAL OPERATING COSTS: Least expensive system is B-1 base system

Alternative Systems	B-1	B-2	B-3	B-4	B-5
Initial investment	$235,065	$315,500	$259,000	$330,041	$330,041
Natural Gas - Annual	$10,196	0	0	$23,166	$23,064
Electricity - Annual	$83,391 93,587	$124,530 124,530	$122,999 122,999	$60,343 [illegible]	$57,571 [illegible]
Maintenance - Annual	$6,500	$7,300	$6,300	$7,300	$7,300
Insurance - Annual (1.0%)	$2,351	$3,155	$2,590	$3,300	$3,300
Ad Valorem Tax - Annual	$2,351	$3,155	$2,590	$3,300	$3,300
First Year Interest (10%)	$17,360	$23,622	$19,425	$24,753	$24,753
First Year Operating cost	$122,149	$161,762	$153,904	$122,162	$119,288
Present Worth of Net Cash Flow	$447,762	$592,511	$557,646	$460,629	$450,915
Rate of Return		N/C	N/C	-2.48%	0.72%
Total Source energy consumption (MMBTU)	4377	6873	5679	5616	5132

TABLE 4-42

DALLAS

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 3b Case No. 27

SYSTEM TITLES:

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

B-3 Electric motor heat pump connected with a closed water loop

B-4 Gas Heat Pump - Mechanically coupled version

B-5 Gas Heat Pump - Electrically coupled version

ANNUAL OPERATING COSTS: Least expensive system is B-1 base system

Alternative Systems	B-1	B-2	B-3	B-4	B-5
Initial investment	$235,065	$315,500	$259,000	$330,041	$330,041
Natural Gas - Annual	$8,314	0	0	$19,526	$19,440
Electricity - Annual	$43,120 51,434	$65,739 65,739	$65,017 [illegible]	$29,680 [illegible]	$27,795 [illegible]
Maintenance - Annual	$6,500	$7,300	$6,300	$7,300	$7,300
Insurance - Annual (1.0%)	$2,351	$3,155	$2,590	$3,300	$3,300
Ad Valorem Tax - Annual	$2,351	$3,155	$2,590	$3,300	$3,300
First Year Interest (10 %)	$17,360	$23,622	$19,425	$24,753	$24,753
First Year Operating cost	$80,626	$102,971	$95,922	$87,859	$85,888
Present Worth of Net Cash Flow	$305,282	$393,795	$361,664	$344,883	$338,021
Rate of Return		N/C	N/C	N/C	N/C
Total Source energy consumption (MMBTU)	4111	5393	4709	5931	5531

TABLE 4-43

LOS ANGELES

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 3b Case No. 28

SYSTEM TITLES:
- B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler
- B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler
- B-3 Electric motor heat pump connected with a closed water loop
- B-4 Gas Heat Pump - Mechanically coupled version
- B-5 Gas Heat Pump - Electrically coupled version

ANNUAL OPERATING COSTS: Least expensive system is B-1 base system

Alternative Systems	B-1	B-2	B-3	B-4	B-5
Initial investment	$235,065	$315,500	$259,000	$330,041	$330,041
Natural Gas - Annual	$5,904	0	0	$13,868	$13,805
Electricity - Annual	$38,472 44,376	$60,648 [illegible]	$59,440 [illegible]	$28,153 [illegible]	$26,836 [illegible]
Maintenance - Annual	$6,500	$7,300	$6,300	$7,300	$7,300
Insurance - Annual (1.0%)	$2,351	$3,155	$2,590	$3,300	$3,300
Ad Valorem Tax - Annual	$2,351	$3,155	$2,590	$3,300	$3,300
First Year Interest (10 %)	$17,360	$23,622	$19,425	$24,753	$24,753
First Year Operating cost	$73,568	$97,880	$90,345	$80,674	$79,294
Present Worth of Net Cash Flow	$281,426	$376,587	$342,813	$320,398	$315,733
Rate of Return		N/C	N/C	N/C	N/C
Total Source energy consumption (MMBTU)	3912	5402	4858	5859	5376

TABLE 4-44

CHICAGO

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 3c Case No. 29

SYSTEM TITLES:

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

B-3 Electric motor heat pump connected with a closed water loop

B-4 Gas Heat Pump - Mechanically coupled version

B-5 Gas Heat Pump - Electrically coupled version

ANNUAL OPERATING COSTS: Least expensive system is B-1 base system

Alternative Systems	B-1	B-2	B-3	B-4	B-5
Initial investment	$235,065	$315,500	$259,000	$330,041	$330,041
Natural Gas - Annual	$6,444	0	0	$15,288	$15,169
Electricity - Annual	$45,708 52,152	$68,528 68,528	$64,853 64,853	$32,502 47,790	$31,019 46,188
Maintenance - Annual	$6,500	$7,300	$6,300	$7,300	$7,300
Insurance - Annual (1.0%)	$2,351	$3,155	$2,590	$3,300	$3,300
Ad Valorem Tax - Annual	$2,351	$3,155	$2,590	$3,300	$3,300
First Year Interest (10%)	$17,360	$23,622	$19,425	$24,753	$24,753
First Year Operating cost	$81,344	$105,760	$95,758	$86,383	$84,847
Present Worth of Net Cash Flow	$307,961	$403,221	$361,109	$339,964	$334,482
Rate of Return		N/C	N/C	N/C	N/C
Total Source energy consumption (MMBTU)	5057	8552	7369	5820	5321

TABLE 4-45

NEW YORK

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 3c Case No. 30

SYSTEM TITLES:

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

B-3 Electric motor heat pump connected with a closed water loop

B-4 Gas Heat Pump - Mechanically coupled version

B-5 Gas Heat Pump - Electrically coupled version

ANNUAL OPERATING COSTS: Least expensive system is B-1 base system

Alternative Systems	B-1	B-2	B-3	B-4	B-5
Initial investment	$235,065	$315,500	$259,000	$330,041	$330,041
Natural Gas - Annual	$10,404	0	0	$23,639	$23,535
Electricity - Annual	$105,242 115,646	$145,720 145,720	$143,085 143,085	$75,213 98,852	$73,594 97,129
Maintenance - Annual	$6,500	$7,300	$6,300	$7,300	$7,300
Insurance - Annual (1.0%)	$2,351	$3,155	$2,590	$3,300	$3,300
Ad Valorem Tax - Annual	$2,351	$3,155	$2,590	$3,300	$3,300
First Year Interest (10%)	17,360	$23,622	$19,425	$24,753	$24,753
First Year Operating cost	$144,838	$182,952	$173,990	$137,990	$135,782
Present Worth of Net Cash Flow	$522,574	$664,135	$625,538	$512,490	$506,666
Rate of Return		N/C	N/C	4.36%	5.80%
Total Source energy consumption (MMBTU)	4377	6873	5679	5616	5132

TABLE 4-46

LOS ANGELES

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 3c Case No. 31

SYSTEM TITLES:

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

B-3 Electric motor heat pump connected with a closed water loop

B-4 Gas Heat Pump - Mechanically coupled version

B-5 Gas Heat Pump - Electrically coupled version

ANNUAL OPERATING COSTS: Least expensive system is B-1 base system

Alternative Systems	B-1	B-2	B-3	B-4	B-5
Initial investment	$235,065	$315,500	$259,000	$330,041	$330,041
Natural Gas - Annual	$5,462	0	0	$12,829	$12,771
Electricity - Annual	$40,134 45,596	$59,390 59,390	$56,807 56,807	$28,700 41,529	$27,421 40,192
Maintenance - Annual	$6,500	$7,300	$6,300	$7,300	$7,300
Insurance - Annual (1.0%)	$2,351	$3,155	$2,590	$3,300	$3,300
Ad Valorem Tax - Annual	$2,351	$3,155	$2,590	$3,300	$3,300
First Year Interest (10%)	$17,360	$23,622	$19,425	$24,753	$24,753
First Year Operating cost	$74,788	$96,622	$87,712	$80,182	$78,845
Present Worth of Net Cash Flow	$285,801	$372,335	$333,913	$318,735	$314,216
Rate of Return		N/C	N/C	N/C	-10.14%
Total Source energy consumption (MMBTU)	3912	5402	4858	5859	5376

TABLE 4-47

EXTENSION STUDY

Sensitivity to Cool/Heat Ratio 0.59 (Factor 0.75)

GIA No. 1

SUMMARY OF ECONOMIC COMPARISONS

ECONOMY MOTEL

Category 2a
Case No. 3

SYSTEM TITLES:
- A-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler.
- A-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler
- A-6 Gas Heat Pump -- Electrically coupled version

ANNUAL OPERATING COSTS:

Alternative Systems	A-1	A-2	A-6
Initial Investment	$315,000	$326,000	$345,868
Natural Gas - Annual	8,190	0	17,256
Electricity - Annual	35,833	61,448	17,686
Total Utility Cost - Annual	44,023	61,448	34,942
Maintenance - Annual	$ 6,500	$ 7,300	$ 7,300
Insurance - Annual (1.0%)	$ 3,150	$ 3,260	$ 3,459
Ad Valorem Tax - Annual	$ 3,150	$ 3,200	$ 3,459
First Year Interest (10.0%)	$ 23,625	$ 24,465	$ 25,940
First Year Operating Cost	80,448	99,733	75,100
Present Worth of Net Cash Flow	$317,456	$384,273	$303,841
Rate of Return	-	N/C	11.45
Total Source Energy Consumption (MMBTU)	9,679	13,424	9,296

TABLE 4-48

EXTENSION STUDY

Sensitivity to Cool/Heat Ratio 0.45 (Factor 1.00)

GIA No. 2

SUMMARY OF ECONOMIC COMPARISONS

ECONOMY MOTEL

Category 2a
Case No. 3

SYSTEM TITLES:

A-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler.

A-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

A-6 Gas Heat Pump -- Electrically coupled version

ANNUAL OPERATING COSTS:

Alternative Systems	A-1	A-2	A-6
Initial Investment	$315,000	$326,000	$345,868
Natural Gas - Annual	10,584	0	$ 19,134
Electricity - Annual	$ 35,833	$ 69,857	$ 17,446
Total Utility Cost - Annual	$ 46,417	$ 69,857	$ 36,580
Maintenance - Annual	$ 6,500	$ 7,300	$ 7,300
Insurance - Annual (1.0%)	$ 3,150	$ 3,260	$ 3,459
Ad Valorem Tax - Annual	$ 3,150	$ 3,200	$ 3,459
First Year Interest (10.0%)	$ 23,625	$ 24,465	$ 25,940
First Year Operating Cost	82,842	108,142	76,738
Present Worth of Net Cash Flow	$325,548	$412,696	$309,377
Rate of Return	-	N/C	13.06
Total Source Energy Consumption (MMBTU)	10,823	15,978	10,126

TABLE 4-49

EXTENSION STUDY

Sensitivity to Cool/Heat Ratio 0.36 (Factor 1.25)

GIA No. 3

SUMMARY OF ECONOMIC COMPARISONS

ECONOMY MOTEL

Category 2a
Case No. 3

SYSTEM TITLES:
- A-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler.
- A-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler
- A-6 Gas Heat Pump -- Electrically coupled version

ANNUAL OPERATING COSTS:

Alternative Systems	A-1	A-2	A-6
Initial Investment	$315,000	$326,000	$345,868
Natural Gas - Annual	$ 13,055	0	$ 21,214
Electricity - Annual	$ 35,833	$ 78,544	$ 17,289
Total Utility Cost - Annual	$ 48,888	$ 78,544	$ 38,503
Maintenance - Annual	$ 6,500	$ 7,300	$ 7,300
Insurance - Annual (1.0%)	$ 3,150	$ 3,260	$ 3,459
Ad Valorem Tax - Annual	$ 3,150	$ 3,200	$ 3,459
First Year Interest (10.0%)	$ 23,625	$ 24,465	$ 25,940
First Year Operating Cost	85,313	116,829	78,661
Present Worth of Net Cash Flow	333,900	442,059	315,877
Rate of Return	-	N/C	14.18
Total Source Energy Consumption (MMBTU)	12,004	18,537	11,084

TABLE 4-50

EXTENSION STUDY

Sensitivity to Heat Exchanger Area - Large

GIA No. 4

SUMMARY OF ECONOMIC COMPARISONS

ECONOMY MOTEL

Category 2a
Case No. 3

SYSTEM TITLES:
- A-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler.
- A-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler
- A-6 Gas Heat Pump -- Electrically coupled version

ANNUAL OPERATING COSTS:

Alternative Systems	A-1	A-2	A-6
Initial Investment	$315,000	$326,000	$345,868
Natural Gas - Annual	$ 10,584	0	$ 19,134
Electricity - Annual	$ 35,833	$ 69,857	$ 17,446
Total Utility Cost - Annual	$ 46,417	$ 69,857	$ 36,580
Maintenance - Annual	$ 6,500	$ 7,300	$ 7,300
Insurance - Annual (1.0%)	$ 3,150	$ 3,260	$ 3,459
Ad Valorem Tax - Annual	$ 3,150	$ 3,200	$ 3,459
First Year Interest (10.0%)	$ 23,625	$ 24,465	$ 25,940
First Year Operating Cost	$ 82,842	$108,142	$ 76,738
Present Worth of Net Cash Flow	$325,548	$412,696	$309,377
Rate of Return	-	N/C	13.06
Total Source Energy Consumption (MMBTU)	10,823	15,978	10,126

TABLE 4-51

EXTENSION STUDY

Sensitivity to Heat Exchange Area - Medium

GIA No. 5

SUMMARY OF ECONOMIC COMPARISONS

ECONOMY MOTEL

Category 2a
Case No. 3

SYSTEM TITLES:

A-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler.

A-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler

A-6 Gas Heat Pump -- Electrically coupled version

ANNUAL OPERATING COSTS:

Alternative Systems	A-1	A-2	A-6
Initial Investment	$315,000	$326,000	$345,868
Natural Gas - Annual	$ 10,584	0	$ 19,106
Electricity - Annual	$ 35,833	$ 69,857	$ 21,036
Total Utility Cost - Annual	$ 46,417	$ 69,857	$ 40,142
Maintenance - Annual	$ 6,500	$ 7,300	$ 7,300
Insurance - Annual (1.0%)	$ 3,150	$ 3,260	$ 3,459
Ad Valorem Tax - Annual	$ 3,150	$ 3,200	$ 3,459
First Year Interest (10.0%)	$ 23,625	$ 24,465	$ 25,940
First Year Operating Cost	$ 82,842	$108,142	$ 80,300
Present Worth of Net Cash Flow	$325,548	$412,696	$321,417
Rate of Return	-	N/C	5.00
Total Source Energy Consumption (MMBTU)	10,823	15,978	10,117

TABLE 4-52

EXTENSION STUDY

Sensitivity to Heat Exchange Area - Small

GIA No. 6

SUMMARY OF ECONOMIC COMPARISONS

ECONOMY MOTEL

Category 2a
Case No. 3

SYSTEM TITLES:
- A-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler.
- A-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condenser and electric boiler
- A-6 Gas Heat Pump -- Electrically coupled version

ANNUAL OPERATING COSTS:

Alternative Systems	A-1	A-2	A-6
Initial Investment	$315,000	$326,000	$345,868
Natural Gas - Annual	$ 10,584	0	$ 19,103
Electricity - Annual	$ 35,833	$ 69,857	$ 21,238
Total Utility Cost - Annual	$ 46,417	$ 69,857	$ 40,341
Maintenance - Annual	$ 6,500	$ 7,300	$ 7,300
Insurance - Annual (1.0%)	$ 3,150	$ 3,260	$ 3,459
Ad Valorem Tax - Annual	$ 3,150	$ 3,200	$ 3,459
First Year Interest (10.0%)	$ 23,625	$ 24,465	$ 25,940
First Year Operating Cost	$ 82,842	$108,142	$ 80,499
Present Worth of Net Cash Flow	$325,548	$412,696	$322,089
Rate of Return	-	N/C	4.49
Total Source Energy Consumption (MMBTU)	10,823	15,978	10,167

TABLE 4-53

EXTENSION STUDY

New Base System

GIA No. 7

CHICAGO

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 2b
Case No. 11

SYSTEM TITLES:

B-1.1 Electric motor reciprocating compressor chiller with electric hot water boiler

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condensor and electric boiler.

ANNUAL OPERATING COSTS: Least expensive system B-1.1 is base system

Alternative Systems	B-1.1	B-1	B-2
Initial Investment	$232,900	$235,065	$315,500
Natural Gas - Annual	0	$ 6,444	0
Electricity - Annual	$ 63,283	$ 41,929	$ 62,316
Total Utility Cost - Annual	$ 63,283	$ 48,373	$ 62,316
Maintenance - Annual	$ 6,500	$ 6,500	$ 7,300
Insurance - Annual (1.0%)	$ 2,329	$ 2,351	$ 3,155
Ad Valorem Tax - Annual	$ 2,329	$ 2,351	$ 3,155
First Year Interest (10%)	$ 17,467	$ 17,630	$ 23,662
First Year Operating Cost	$ 91,908	$ 77,205	$ 99,588
Present Worth of Net Cash Flow	$344,439	$294,936	$382,225
Rate of Return	---	370.51	N/C
Total Source Energy Consumption (MMBTU)	7,305	5,057	8,552

TABLE 4-54

EXTENSION STUDY

New Base System

GIA No. 8

CLEVELAND

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 2b
Case No. 12

SYSTEM TITLES:

B-1.1 Electric motor reciprocating compressor chiller with electric hot water boiler

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condensor and electric boiler.

ANNUAL OPERATING COSTS: Least expensive system B-1.1 is base system

Alternative Systems	B-1.1	B-1	B-2
Initial Investment	$232,900	$235,065	$315,500
Natural Gas - Annual	0	$ 6,094	0
Electricity - Annual	$ 58,603	$ 38,857	$ 57,392
Total Utility Cost - Annual	$ 58,603	$ 44,951	$ 57,392
Maintenance - Annual	$ 6,500	$ 6,500	$ 7,300
Insurance - Annual (1.0%)	$ 2,329	$ 2,351	$ 3,155
Ad Valorem Tax - Annual	$ 2,329	$ 2,351	$ 3,155
First Year Interest (10%)	$ 17,467	$ 17,630	$ 23,662
First Year Operating Cost	$ 87,228	$ 73,783	$ 94,664
Present Worth of Net Cash Flow	$344,439	$294,936	$382,225
Rate of Return	---	338.28	N/C
Total Source Energy Consumption (MMBTU)	7,305	5,057	8,552

TABLE 4-55

EXTENSION STUDY

New Base System

GIA No. 9 NEW YORK

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 2b
Case No. 14

SYSTEM TITLES:

B-1.1 Electric motor reciprocating compressor chiller with electric hot water boiler

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condensor and electric boiler.

ANNUAL OPERATING COSTS: Least expensive system B-1.1 is base system

Alternative Systems	B-1.1	B-1	B-2
Initial Investment	$232,900	$235,065	$315,500
Natural Gas - Annual	0	$ 10,404	0
Electricity - Annual	$124,983	$ 84,148	$124,116
Total Utility Cost - Annual	$124,983	$ 94,552	$124,116
Maintenance - Annual	$ 6,500	$ 6,500	$ 7,300
Insurance - Annual (1.0%)	$ 2,329	$ 2,351	$ 3,155
Ad Valorem Tax - Annual	$ 2,329	$ 2,351	$ 3,155
First Year Interest (10%)	$ 17,467	$ 17,630	$ 23,662
First Year Operating Cost	$153,608	$123,384	$161,388
Present Worth of Net Cash Flow	$344,439	$295,936	$382,225
Rate of Return	---	742.19	N/C
Total Source Energy Consumption (MMBTU)	7,305	5,057	8,552

TABLE 4-56

EXTENSION STUDY

New Base System

GIA No. 10

DALLAS

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 2b
Case No. 16

SYSTEM TITLES:

B-1.1 Electric motor reciprocating compressor chiller with electric hot water boiler

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condensor and electric boiler.

ANNUAL OPERATING COSTS: Least expensive system B-1.1 is base system

Alternative Systems	B-1.1	B-1	B-2
Initial Investment	$232,900	$235,065	$315,500
Natural Gas - Annual	0	$ 6,445	0
Electricity - Annual	$ 57,661	$ 38,058	$ 57,385
Total Utility Cost - Annual	$ 57,661	$ 44,503	$ 57,385
Maintenance - Annual	$ 6,500	$ 6,500	$ 7,300
Insurance - Annual (1.0%)	$ 7,329	$ 2,351	$ 3,155
Ad Valorem Tax - Annual	$ 2,329	$ 2,351	$ 3,155
First Year Interest (10%)	$ 17,467	$ 17,630	$ 23,662
First Year Operating Cost	$ 86,286	$ 73,335	$ 94,657
Present Worth of Net Cash Flow	$344,439	$294,936	$382,225
Rate of Return	---	327.54	N/C
Total Source Energy Consumption (MMBTU)	7,305	5,057	8,552

TABLE 4-57

EXTENSION STUDY

New Base System

GIA No. 11 LOS ANGELES

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 2b
Case No. 18

SYSTEM TITLES:

B-1.1 Electric motor reciprocating compressor chiller with electric hot water boiler

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condensor and electric boiler.

ANNUAL OPERATING COSTS: Least expensive system B-1.1 is base system

Alternative Systems	B-1.1	B-1	B-2
Initial Investment	$232,900	$235,065	$315,500
Natural Gas - Annual	0	5,462	0
Electricity - Annual	$ 56,515	$ 36,412	$ 55,865
Total Utility Cost - Annual	$ 56,515	$ 41,874	$ 55,865
Maintenance - Annual	$ 6,500	$ 6,500	$ 7,300
Insurance - Annual (1.0%)	$ 2,329	$ 2,351	$ 3,155
Ad Valorem Tax - Annual	$ 2,329	$ 2,351	$ 3,155
First Year Interest (10%)	$ 17,467	$ 17,639	$ 23,662
First Year Operating Cost	$ 85,140	$ 70,706	$ 93,137
Present Worth of Net Cash Flow	$344,439	$294,936	$382,225
Rate of Return	---	364.06	N/C
Total Source Energy Consumption (MMBTU)	7,305	5,057	8,552

TABLE 4-58

EXTENSION STUDY

New Base System

GIA No. 12 CHICAGO

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 3a
Case No. 19

SYSTEM TITLES:

B-1.1 Electric motor reciprocating compressor chiller with electric hot water boiler

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condensor and electric boiler.

ANNUAL OPERATING COSTS: Least expensive system B-1.1 is base system

Alternative Systems	B-1.1	B-1	B-2
Initial Investment	$232,900	$235,605	$315.500
Natural Gas - Annual	0	$ 9,569	0
Electricity - Annual	$ 67,207	$ 44,529	$ 68,044
Total Utility Cost - Annual	$ 67,207	$ 54,098	$ 68,044
Maintenance - Annual	$ 6,500	$ 6,500	$ 7,300
Insurance - Annual (1.0%)	$ 2,329	$ 2,351	$ 3,155
Ad Valorem Tax - Annual	$ 2,329	$ 2,351	$ 3,155
First Year Interest (10%)	$ 17,467	$ 17,630	$ 23,662
First Year Operating Cost	$ 95,832	$ 82,930	$105,316
Present Worth of Net Cash Flow	$344,439	$294,936	$382,225
Rate of Return	---	$327.54	N/C
Total Source Energy Consumption (MMBTU)	7,305	5,057	8,552

TABLE 4-59

EXTENSION STUDY

New Base System

GIA No. 13 CLEVELAND

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 3a
Case No. 20

SYSTEM TITLES:

B-1.1 Electric motor reciprocating compressor chiller with electric hot water boiler

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condensor and electric boiler.

ANNUAL OPERATING COSTS: Least expensive system B-1.1 is base system

Alternative Systems	B-1.1	B-1	B-2
Initial Investment	$232,900	$235,065	$315,500
Natural Gas - Annual	0	$ 10,469	0
Electricity - Annual	$ 64,346	$ 42,665	$ 65,473
Total Utility Cost - Annual	$ 64,346	$ 53,134	$ 65,473
Maintenance - Annual	$ 6,500	$ 6,500	$ 7,300
Insurance - Annual (1.0%)	$ 2,329	$ 2,351	$ 3,155
Ad Valorem Tax - Annual	$ 2,329	$ 2,351	$ 3,155
First Year Interest (10%)	$ 17,467	$ 17,630	$ 23,662
First Year Operating Cost	$ 92,971	$ 81,966	$102,745
Present Worth of Net Cash Flow	$344,439	$294,936	$382,225
Rate of Return	---	278.13	N/C
Total Source Energy Consumption (MMBTU)	7,305	5,057	8,552

TABLE 4-60

EXTENSION STUDY

New Base System

GIA No. 14 NEW YORK

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 3a DOE
Case No. 21

SYSTEM TITLES:

B-1.1 Electric motor reciprocating compressor chiller with electric hot water boiler

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condensor and electric boiler.

ANNUAL OPERATING COSTS: Least expensive system B-1.1 is base system

Alternative Systems	B-1.1	B-1	B-2
Initial Investment	$232,900	$235,065	$315,500
Natural Gas - Annual	0	$ 13,005	0
Electricity - Annual	$116,984	$ 78,762	$117,619
Total Utility Cost - Annual	$116,984	$ 91,767	$117,619
Maintenance - Annual	$ 6,500	$ 6,500	$ 7,300
Insurance - Annual (1.0%)	$ 2,329	$ 2,351	$ 3,155
Ad Valorem Tax - Annual	$ 2,329	$ 2,351	$ 3,155
First Year Interest (10%)	$ 17,467	$ 17,630	$ 23,662
First Year Operating Cost	$145,609	$120,599	$154,891
Present Worth of Net Cash Flow	$344,439	$294,936	$382,225
Rate of Return	---	$626.17	N/C
Total Source Energy Consumption (MMBTU)	7,305	5,057	8,552

TABLE 4-61

EXTENSION STUDY

New Base System

GIA No. 15 DALLAS

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 3a DOE
Case No. 22

SYSTEM TITLES:

B-1.1 Electric motor reciprocating compressor chiller with electric hot water boiler

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condensor and electric boiler.

ANNUAL OPERATING COSTS: Least expensive system B-1.1 is base system

Alternative Systems	B-1.1	B-1	B-2
Initial Investment	$232,900	$235,065	$315,500
Natural Gas - Annual	0	$ 10,666	0
Electricity - Annual	$ 73,287	$ 48,372	$ 73,746
Total Utility Cost - Annual	$ 73,287	$ 59,038	$ 73,746
Maintenance - Annual	$ 6,500	$ 6,500	$ 7,300
Insurance - Annual (1.0%)	$ 2,329	$ 2,351	$ 3,155
Ad Valorem Tax - Annual	$ 2,329	$ 2,351	$ 3.155
First Year Interest (10%)	$ 17,467	$ 17,630	$ 23,662
First Year Operating Cost	$101,912	$ 87,870	$111,018
Present Worth of Net Cash Flow	$344,439	$94,936	$382,225
Rate of Return	---	355.47	N/C
Total Source Energy Consumption (MMBTU)	7,305	5,057	8,552

TABLE 4-62

EXTENSION STUDY

New Base System

GIA No. 16

LOS ANGELES

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 3a DOE
Case No. 23

SYSTEM TITLES:

B-1.1 Electric motor reciprocating compressor chiller with electric hot water boiler

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condensor and electric boiler.

ANNUAL OPERATING COSTS: Least expensive system B-1.1 is base system

Alternative Systems	B-1.1	B-1	B-2
Initial Investment	$232,900	$235,065	$315,500
Natural Gas - Annual	0	$ 8,602	0
Electricity - Annual	$ 61,149	$ 39,398	$ 61,674
Total Utility Cost - Annual	$ 61,149	$ 48,000	$ 61,674
Maintenance - Annual	$ 6,500	$ 6,500	$ 7,300
Insurance - Annual (1.0%)	$ 2,329	$ 2,351	$ 3,155
Ad Valorem Tax - Annual	$ 2,329	$ 2,351	$ 3,155
First Year Interest (10%)	$ 89,774	$ 76,832	$ 98,946
First Year Operating Cost	$ 17,467	$ 17,630	$ 23,662
Present Worth of Net Cash Flow	$344,439	$294,936	$382,225
Rate of Return	---	327.54	N/C
Total Source Energy Consumption (MMBTU)	7,305	5,057	8,552

TABLE 4-63

EXTENSION STUDY

New Base System

GIA No. 17

CHICAGO

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 3b AGA
Case No. 24

SYSTEM TITLES:

B-1.1 Electric motor reciprocating compressor chiller with electric hot water boiler

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condensor and electric boiler.

ANNUAL OPERATING COSTS: Least expensive system B-1.1 is base system

Alternative Systems	B-1.1	B-1	B-2
Initial Investment	$232,900	$235,065	$315,500
Natural Gas - Annual	0	$ 6,921	0
Electricity - Annual	$ 68,347	$ 45,283	$ 69,198
Total Utility Cost - Annual	$ 68,347	$ 52,204	$ 69,198
Maintenance - Annual	$ 6,500	$ 6,500	$ 7,300
Insurance - Annual (1.0%)	$ 2,329	$ 2,351	$ 3,155
Ad Valorem Tax - Annual	$ 2,329	$ 2,351	$ 3,155
First Year Interest (10%)	$ 17,467	$ 17,630	$ 23,662
First Year Operating Cost	$ 96,972	$ 81,036	$106,470
Present Worth of Net Cash Flow	$344,439	$294,936	$382,225
Rate of Return	---	402.73	N/C
Total Source Energy Consumption (MMBTU)	7,305	5,057	8,552

TABLE 4-64

EXTENSION STUDY

New Base System

GIA No. 18

CLEVELAND

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 3b AGA
Case No. 25

SYSTEM TITLES:

B-1.1 Electric motor reciprocating compressor chiller with electric hot water boiler

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condensor and electric boiler.

ANNUAL OPERATING COSTS: Least expensive system B-1.1 is base system

Alternative Systems	B-1.1	B-1	B-2
Initial Investment	$232,900	$235,065	$315,500
Natural Gas - Annual	0	$ 6,544	0
Electricity - Annual	$ 63,291	$ 41,966	$ 64,399
Total Utility Cost - Annual	$ 63,291	$ 48,510	$ 64,399
Maintenance - Annual	$ 6,500	$ 6,500	$ 7,300
Insurance - Annual (1.0%)	$ 2,329	$ 2,351	$ 3,155
Ad Valorem Tax - Annual	$ 2,329	$ 2,351	$ 3,155
First Year Interest (10%)	$ 17,467	$ 17,630	$ 23,662
First Year Operating Cost	$ 91,916	$ 77,342	$101,671
Present Worth of Net Cash Flow	$344,439	$294,936	$382,225
Rate of Return	---	366.21	N/C
Total Source Energy Consumption (MMBTU)	7,305	5,057	8,552

TABLE 4-65

EXTENSION STUDY

New Base System

GIA No. 19 NEW YORK

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 3b AGA
Case No. 26

SYSTEM TITLES:

B-1.1 Electric motor reciprocating compressor chiller with electric hot water boiler

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condensor and electric boiler.

ANNUAL OPERATING COSTS: Least expensive system B-1.1 is base system

Alternative Systems	B-1.1	B-1	B-2
Initial Investment	$232,900	$235065	$315,500
Natural Gas - Annual	0	$ 10,196	0
Electricity - Annual	$123,858	$ 83,391	$124,530
Total Utility Cost - Annual	$123,858	$ 93,587	$124,530
Maintenance - Annual	$ 6,500	$ 6,500	$ 7,300
Insurance - Annual (1.0%)	$ 2,329	$ 2,351	$ 3,155
Ad Valorem Tax - Annual	$ 2,329	$ 2,351	$ 3,155
First Year Interest (10%)	$ 17,467	$ 17,630	$ 23,662
First Year Operating Cost	$152,483	$122,419	$161,802
Present Worth of Net Cash Flow	$344,439	$294,936	$382,225
Rate of Return	---	750.78	N/C
Total Source Energy Consumption (MMBTU)	7,305	5,057	8,552

TABLE 4-66

EXTENSION STUDY

New Base System

GIA No. 20 DALLAS

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 3b AGA
Case No. 27

SYSTEM TITLES:

B-1.1 Electric motor reciprocating compressor chiller with electric hot water boiler

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condensor and electric boiler.

ANNUAL OPERATING COSTS: Least expensive system B-1.1 is base system

Alternative Systems	B-1.1	B-1	B-2
Initial Investment	$232,900	$235,065	$315,500
Natural Gas - Annual	0	$ 8,314	0
Electricity - Annual	$ 65,329	$ 43,120	$ 65,739
Total Utility Cost - Annual	$ 65,329	$ 51,434	$ 65,739
Maintenance - Annual	$ 6,500	$ 6,500	$ 7,300
Insurance - Annual (1.0%)	$ 2,329	$ 2,351	$ 3,155
Ad Valorem Tax - Annual	$ 2,329	$ 2,351	$ 3,155
First Year Interest (10%)	$ 17,467	$ 17,630	$ 23,662
First Year Operating Cost	$ 93,954	$ 80,266	$103,011
Present Worth of Net Cash Flow	$344,439	$294,936	$382,225
Rate of Return	---	344.73	N/C
Total Source Energy Consumption (MMBTU)	7,305	5,057	8,552

TABLE 4-67

EXTENSION STUDY

New Base System

GIA No. 21 LOS ANGELES

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 3b AGA
Case No. 28

SYSTEM TITLES:

B-1.1 Electric motor reciprocating compressor chiller with electric hot water boiler

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condensor and electric boiler.

ANNUAL OPERATING COSTS: Least expensive system B-1.1 is base system

Alternative Systems	B-1.1	B-1	B-2
Initial Investment	$232,900	$235,065	$315,500
Natural Gas - Annual	0	$ 5,904	0
Electricity - Annual	$ 60,131	$ 38,472	$ 60,648
Total Utility Cost - Annual	$ 60,131	$ 44,376	$ 60,648
Maintenance - Annual	$ 6,500	$ 6,500	$ 7,300
Insurance - Annual (1.0%)	$ 2,329	$ 2,351	$ 3,155
Ad Valorem Tax - Annual	$ 2,329	$ 2,351	$ 3,155
First Year Interest (10%)	$ 17,467	$ 17,630	$ 23,662
First Year Operating Cost	$ 88,756	$ 73,208	$ 97,920
Present Worth of Net Cash Flow	$344,439	$294,936	$382,225
Rate of Return	--	391.99	N/C
Total Source Energy Consumption (MMBTU)	7,305	5,057	8,552

TABLE 4-68

EXTENSION STUDY

New Base System

GIA No. 22 CHICAGO

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 3c Future
Case No. 30

SYSTEM TITLES:

B-1.1 Electric motor reciprocating compressor chiller with electric hot water boiler

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condensor and electric boiler.

ANNUAL OPERATING COSTS: Least expensive system B-1.1 is base system

Alternative Systems	B-1.1	B-1	B-2
Initial Investment	$232,900	$235,065	$315,500
Natural Gas - Annual	0	$ 6,444	0
Electricity - Annual	$ 66,608	$ 45,708	$ 68,528
Total Utility Cost - Annual	$ 66,608	$ 52,152	$ 68,528
Maintenance - Annual	$ 6,500	$ 6,500	$ 7,300
Insurance - Annual (1.0%)	$ 2,329	$ 2,351	$ 3,155
Ad Valorem Tax - Annual	$ 2,329	$ 2,351	$ 3,155
First Year Interest (10%)	$ 17,467	$ 17,630	$ 23,662
First Year Operating Cost	$ 95,233	$ 80,984	$105,800
Present Worth of Net Cash Flow	$344,439	$294,936	$382,225
Rate of Return	---	359.77	N/C
Total Source Energy Consumption (MMBTU)	7,305	5,057	8,552

TABLE 4-69

EXTENSION STUDY

New Base System

GIA No. 23 NEW YORK

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 3c Future
Case No. 30

SYSTEM TITLES:

B-1.1 Electric motor reciprocating compressor chiller with electric hot water boiler

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condensor and electric boiler.

ANNUAL OPERATING COSTS: Least expensive system B-1.1 is base system

Alternative Systems	B-1.1	B-1	B-2
Initial Investment	$232,900	$235,065	$315,500
Natural Gas - Annual	0	$ 10,404	0
Electricity - Annual	$144,047	$105,242	$145,720
Total Utility Cost - Annual	$144,047	$115,646	$145,720
Maintenance - Annual	$ 6,500	$ 6,500	$ 7,300
Insurance - Annual (1.0%)	$ 2,329	$ 2,351	$ 3,155
Ad Valorem Tax - Annual	$ 2,329	$ 2,351	$ 3,155
First Year Interest (10%)	$ 17,467	$ 17,630	$ 23,662
First Year Operating Cost	$172,672	$144,478	$182,992
Present Worth of Net Cash Flow	$344,439	$294,936	$382,225
Rate of Return	---	707.81	N/C
Total Source Energy Consumption (MMBTU)	7,305	5,057	8,552

TABLE 4-70

EXTENSION STUDY

New Base System

GIA No. 24 LOS ANGELES

SUMMARY OF ECONOMIC COMPARISONS

OFFICE BUILDING

Category 3c Future
Case No. 31

SYSTEM TITLES:

B-1.1 Electric motor reciprocating compressor chiller with electric hot water boiler

B-1 Electric motor reciprocating compressor chiller with gas-fired hot water boiler

B-2 Electric motor reciprocating compressor chiller with a double bundle (heat reclaim) condensor and electric boiler.

ANNUAL OPERATING COSTS: Least expensive system B-1.1 is base system

Alternative Systems	B-1.1	B-1	B-2
Initial Investment	$232,900	$235,065	$315,500
Natural Gas - Annual	0	$ 5,462	0
Electricity - Annual	$ 57,831	$ 40,134	$ 59,390
Total Utility Cost - Annual	$ 57,831	$ 45,596	$ 59,390
Maintenance - Annual	$ 6,500	$ 6,500	$ 7,300
Insurance - Annual (1.0%)	$ 2,329	$ 2,351	$ 3,155
Ad Valorem Tax - Annual	$ 2,329	$ 2,351	$ 3,155
First Year Interest (10%)	$ 17,467	$ 17,630	$ 23,662
First Year Operating Cost	$ 86,456	$ 74,428	$ 96,662
Present Worth of Net Cash Flow	$344,439	$294,936	$382,225
Rate of Return	--	303.91	N/C
Total Source Energy Consumption (MMBTU)	7,305	5,057	8,552

5.0 CHARTS OF ECONOMIC COMPARISIONS AND RELATIVE SOURCE ENERGY COMPARISONS

- Base Study - Motel (Tables 5-1 through 5-5)
- Base Study - Office (Tables 5-6 through 5-10)
- Extension Study - Motel (Tables 5-11 through 5-14)
- Extension Study - Office (Tables 5-15 through 5-19)

TABLE 5-1

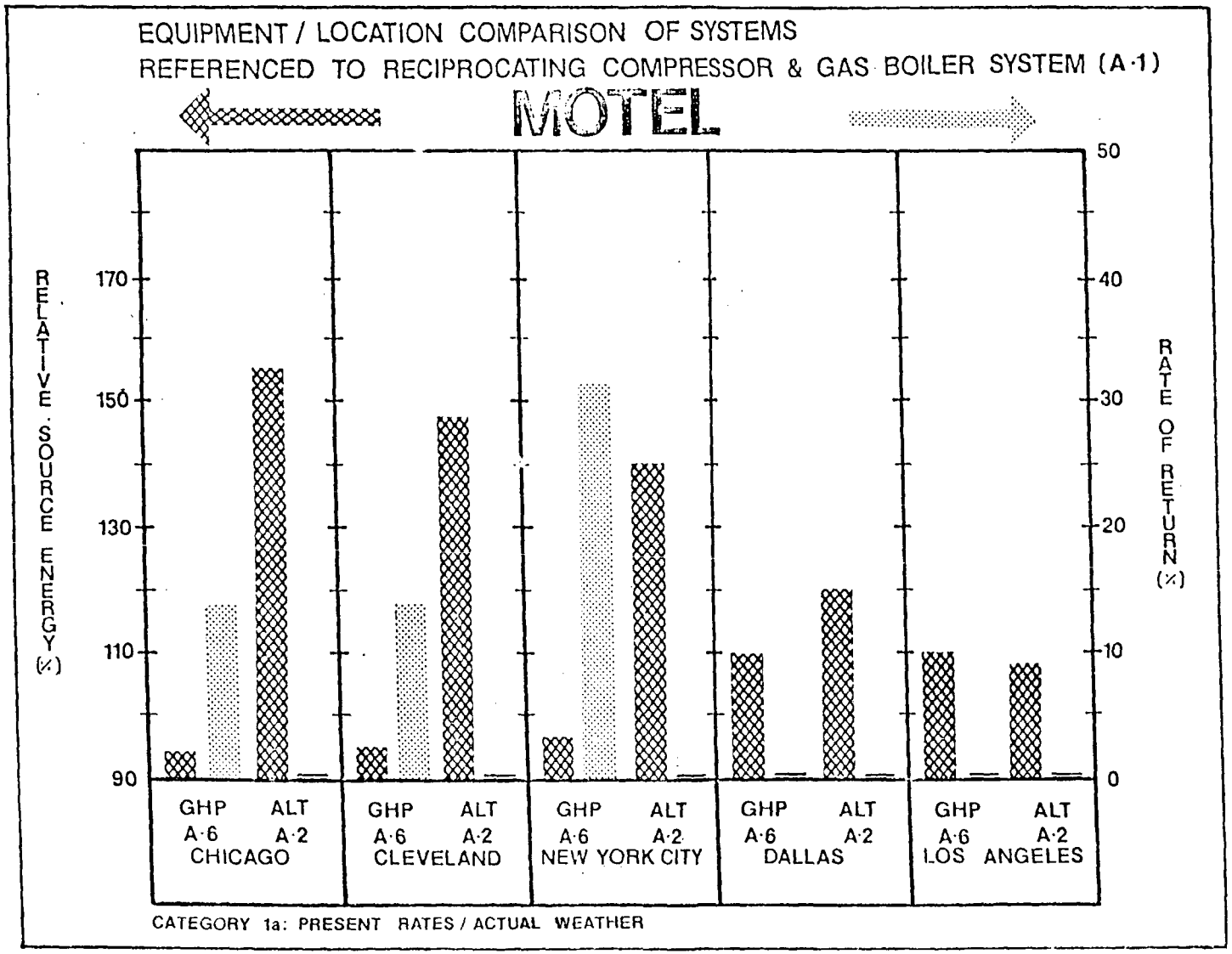

EQUIPMENT / LOCATION COMPARISON OF SYSTEMS
REFERENCED TO RECIPROCATING COMPRESSOR & GAS BOILER SYSTEM (A-1)
MOTEL
RELATIVE SOURCE ENERGY (%)
170
150
130
110
90
RATE OF RETURN (%)
50
40
30
20
10
0
GHP A-6
ALT A-2
CHICAGO
CLEVELAND
NEW YORK CITY
DALLAS
LOS ANGELES
CATEGORY 1a: PRESENT RATES / ACTUAL WEATHER

TABLE 5-2

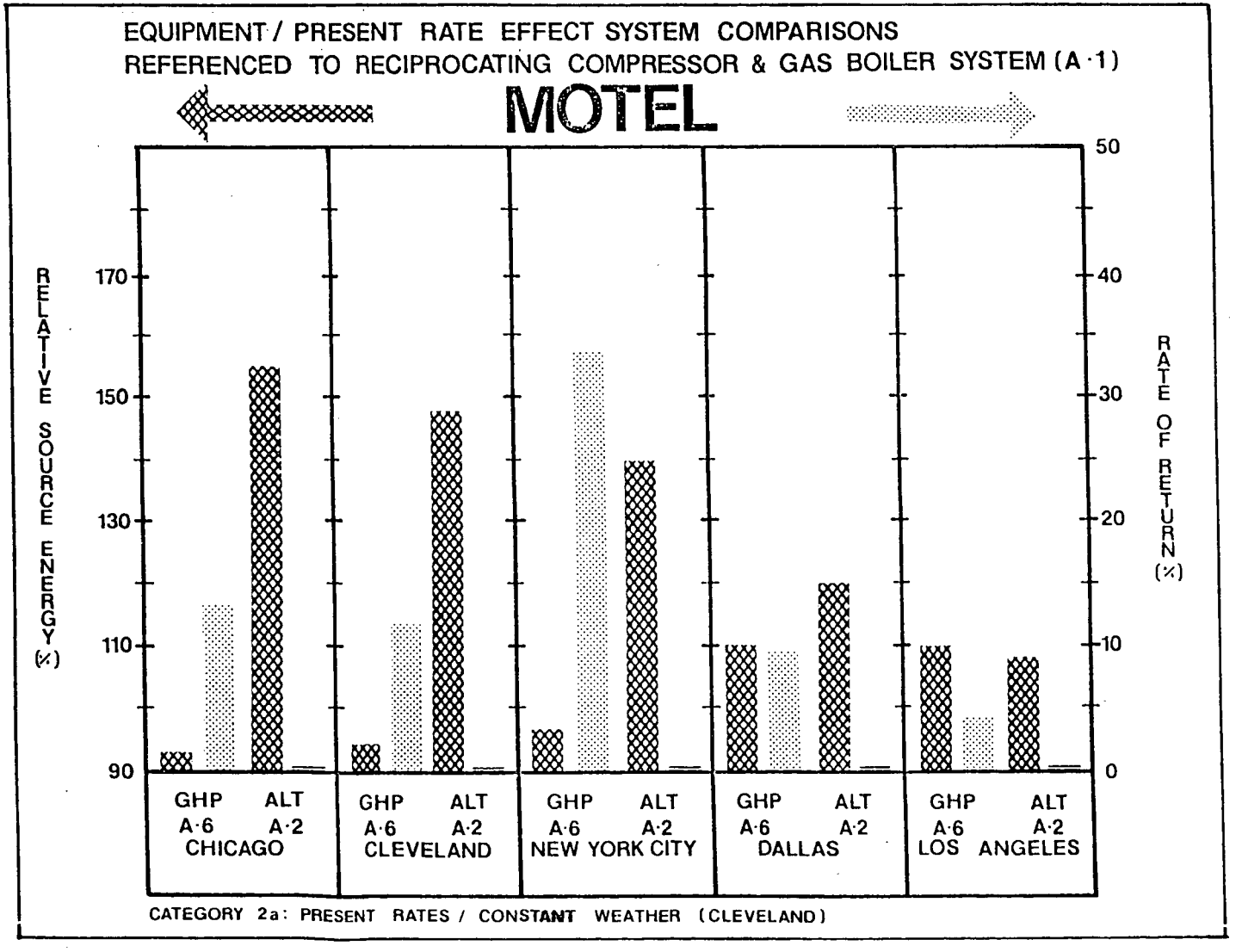

EQUIPMENT / PRESENT RATE EFFECT SYSTEM COMPARISONS
REFERENCED TO RECIPROCATING COMPRESSOR & GAS BOILER SYSTEM (A·1)
MOTEL
RELATIVE SOURCE ENERGY (%)
170
150
130
110
90
RATE OF RETURN (%)
50
40
30
20
10
0
GHP A·6
ALT A·2
CHICAGO
GHP A·6
ALT A·2
CLEVELAND
GHP A·6
ALT A·2
NEW YORK CITY
GHP A·6
ALT A·2
DALLAS
GHP A·6
ALT A·2
LOS ANGELES
CATEGORY 2a: PRESENT RATES / CONSTANT WEATHER (CLEVELAND)

TABLE 5-3

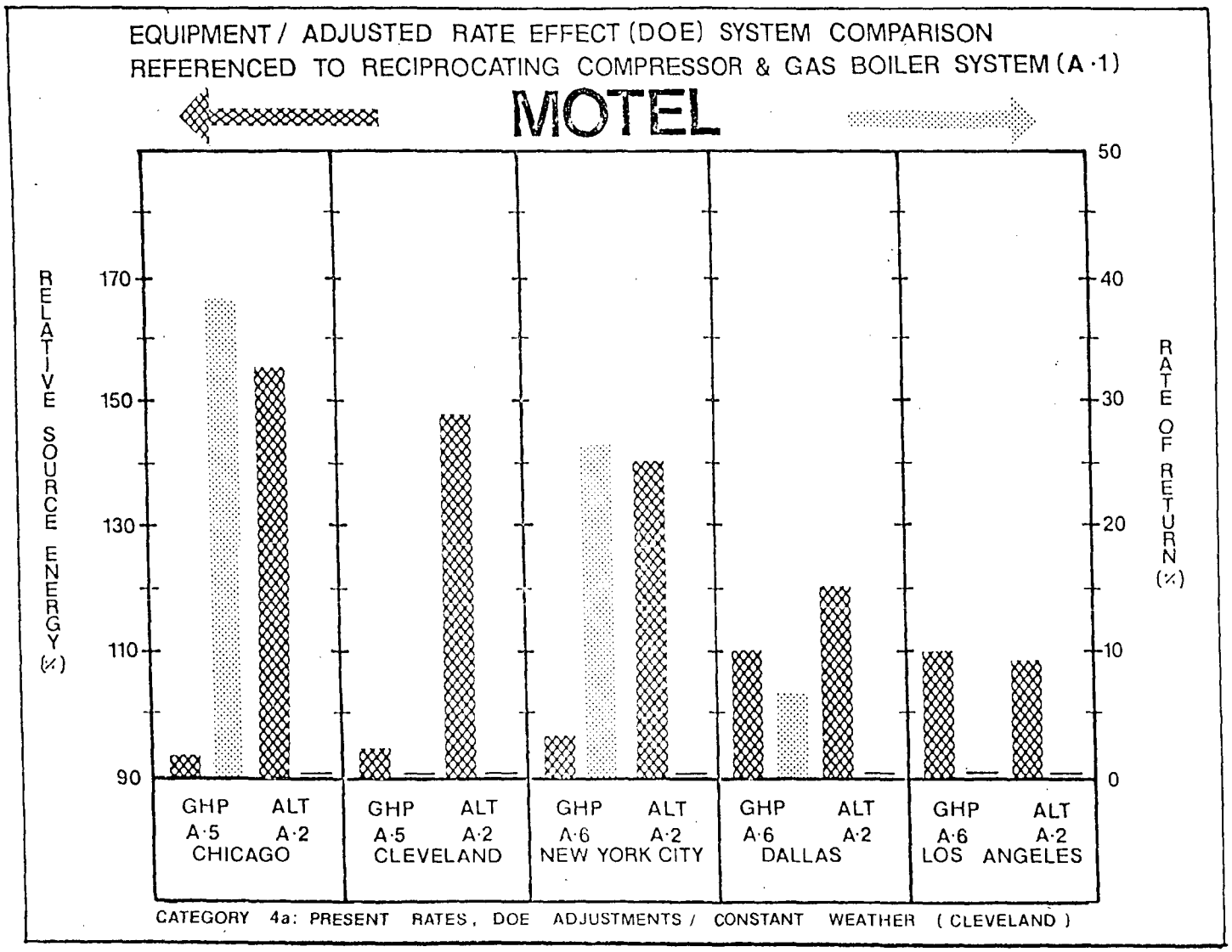

EQUIPMENT / ADJUSTED RATE EFFECT (DOE) SYSTEM COMPARISON
REFERENCED TO RECIPROCATING COMPRESSOR & GAS BOILER SYSTEM (A·1)
MOTEL
RELATIVE SOURCE ENERGY (%)
170
150
130
110
90
RATE OF RETURN (%)
50
40
30
20
10
0
GHP A·5
ALT A·2
CHICAGO
GHP A·5
ALT A·2
CLEVELAND
GHP A·6
ALT A·2
NEW YORK CITY
GHP A·6
ALT A·2
DALLAS
GHP A·6
ALT A·2
LOS ANGELES
CATEGORY 4a: PRESENT RATES, DOE ADJUSTMENTS / CONSTANT WEATHER (CLEVELAND)

TABLE 5-4

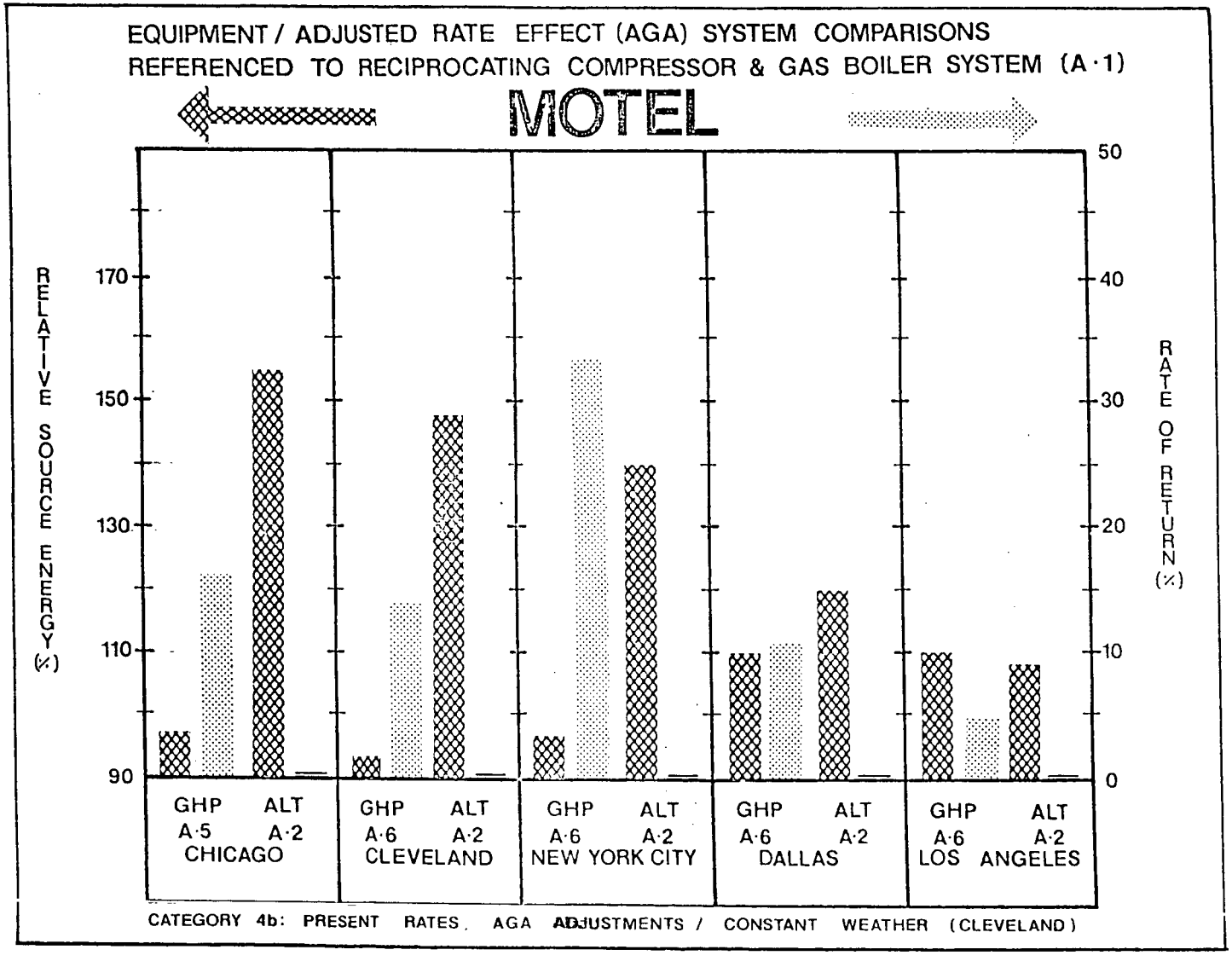

EQUIPMENT / ADJUSTED RATE EFFECT (AGA) SYSTEM COMPARISONS
REFERENCED TO RECIPROCATING COMPRESSOR & GAS BOILER SYSTEM (A·1)
MOTEL
RELATIVE SOURCE ENERGY (%)
170
150
130
110
90
RATE OF RETURN (%)
50
40
30
20
10
0
GHP A·5
ALT A·2
CHICAGO
GHP A·6
ALT A·2
CLEVELAND
GHP A·6
ALT A·2
NEW YORK CITY
GHP A·6
ALT A·2
DALLAS
GHP A·6
ALT A·2
LOS ANGELES
CATEGORY 4b: PRESENT RATES, AGA ADJUSTMENTS / CONSTANT WEATHER (CLEVELAND)

TABLE 5-5

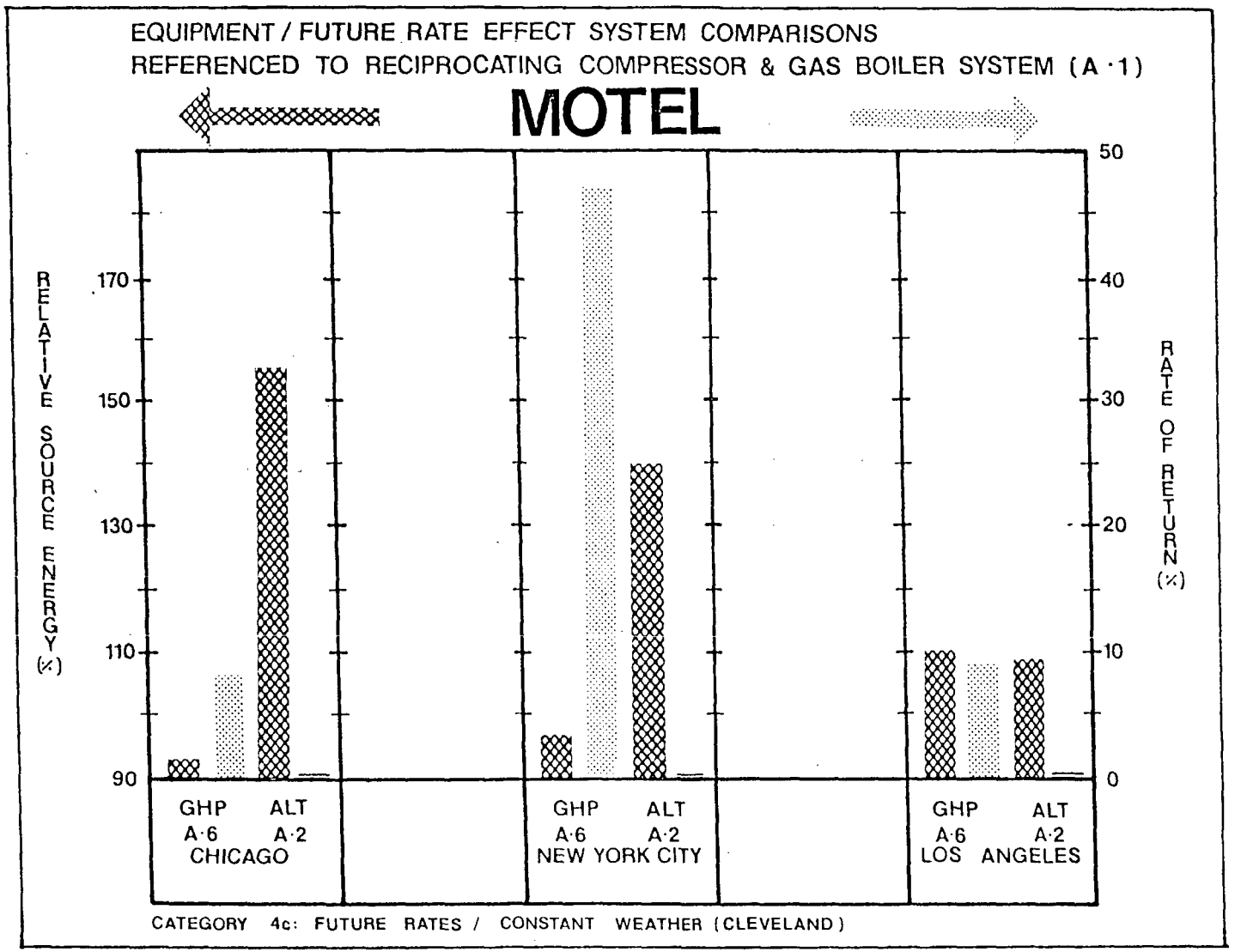

EQUIPMENT / FUTURE RATE EFFECT SYSTEM COMPARISONS
REFERENCED TO RECIPROCATING COMPRESSOR & GAS BOILER SYSTEM (A·1)
MOTEL
RELATIVE SOURCE ENERGY (%)
170
150
130
110
90
RATE OF RETURN (%)
50
40
30
20
10
0
GHP A·6
ALT A·2
CHICAGO
GHP A·6
ALT A·2
NEW YORK CITY
GHP A·6
ALT A·2
LOS ANGELES
CATEGORY 4c: FUTURE RATES / CONSTANT WEATHER (CLEVELAND)

TABLE 5-7

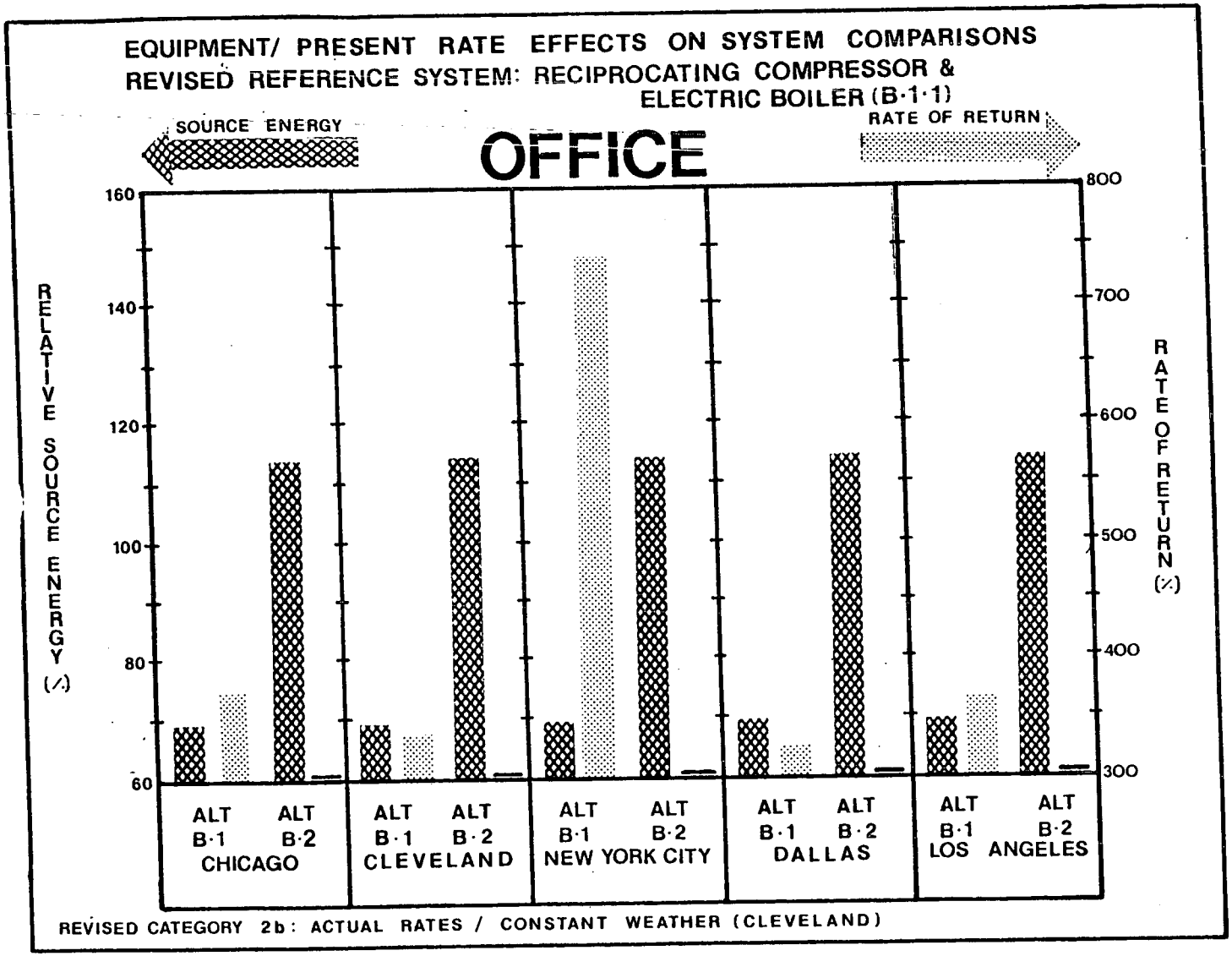

EQUIPMENT/ PRESENT RATE EFFECTS ON SYSTEM COMPARISONS
REVISED REFERENCE SYSTEM: RECIPROCATING COMPRESSOR & ELECTRIC BOILER (B·1·1)
SOURCE ENERGY
OFFICE
RATE OF RETURN
RELATIVE SOURCE ENERGY (%)
RATE OF RETURN (%)
160
140
120
100
80
60
800
700
600
500
400
300
ALT B·1
ALT B·2
CHICAGO
ALT B·1
ALT B·2
CLEVELAND
ALT B·1
ALT B·2
NEW YORK CITY
ALT B·1
ALT B·2
DALLAS
ALT B·1
ALT B·2
LOS ANGELES
REVISED CATEGORY 2b: ACTUAL RATES / CONSTANT WEATHER (CLEVELAND)

TABLE 5-7

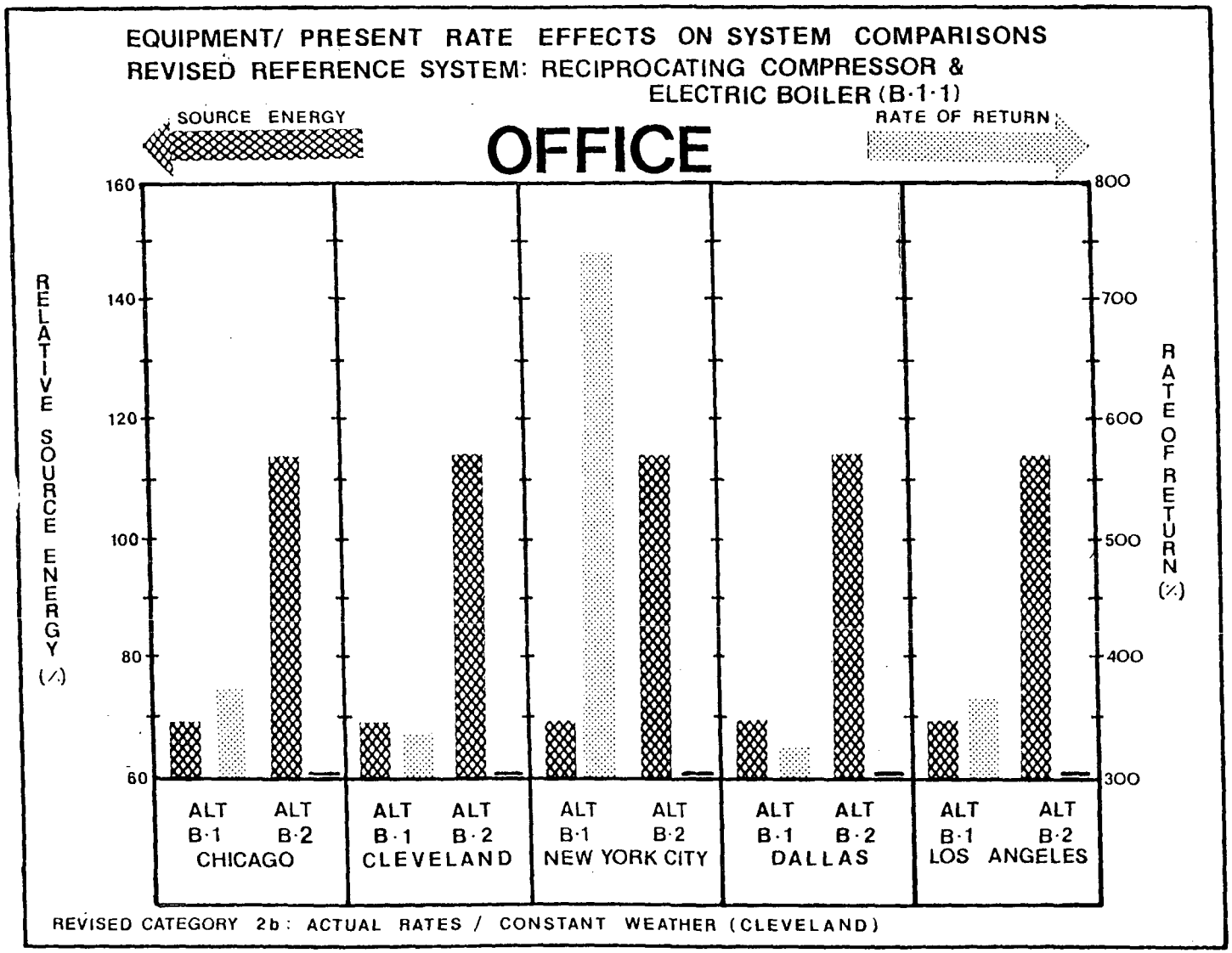

EQUIPMENT/ PRESENT RATE EFFECTS ON SYSTEM COMPARISONS
REVISED REFERENCE SYSTEM: RECIPROCATING COMPRESSOR & ELECTRIC BOILER (B·1·1)
SOURCE ENERGY
OFFICE
RATE OF RETURN
RELATIVE SOURCE ENERGY (%)
RATE OF RETURN (%)
160
140
120
100
80
60
800
700
600
500
400
300
ALT B·1
ALT B·2
CHICAGO
ALT B·1
ALT B·2
CLEVELAND
ALT B·1
ALT B·2
NEW YORK CITY
ALT B·1
ALT B·2
DALLAS
ALT B·1
ALT B·2
LOS ANGELES
REVISED CATEGORY 2b: ACTUAL RATES / CONSTANT WEATHER (CLEVELAND)

TABLE 5-8

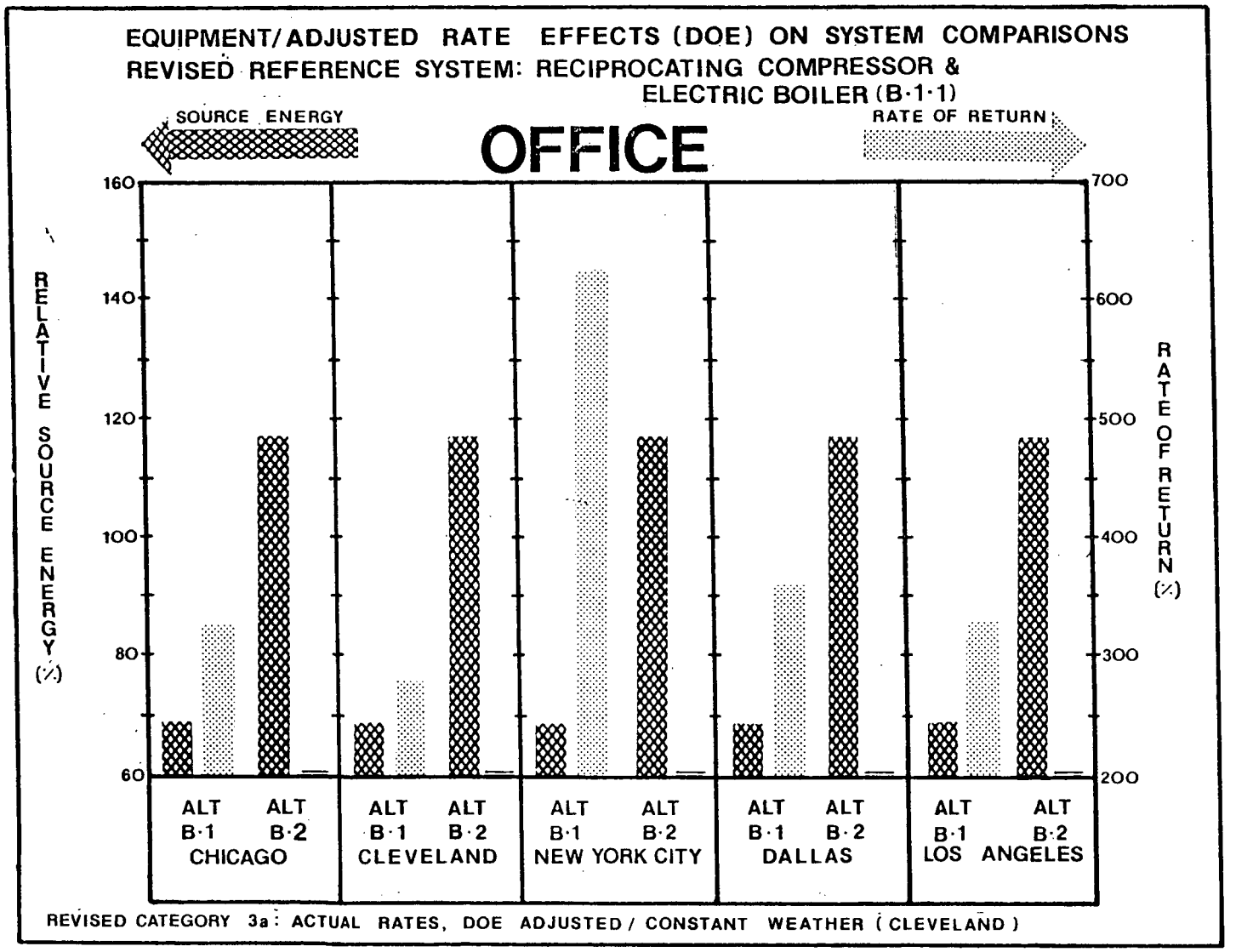

EQUIPMENT/ADJUSTED RATE EFFECTS (DOE) ON SYSTEM COMPARISONS
REVISED REFERENCE SYSTEM: RECIPROCATING COMPRESSOR & ELECTRIC BOILER (B·1·1)
SOURCE ENERGY
OFFICE
RATE OF RETURN
RELATIVE SOURCE ENERGY (%)
RATE OF RETURN (%)
160
140
120
100
80
60
700
600
500
400
300
200
ALT B·1
ALT B·2
CHICAGO
CLEVELAND
NEW YORK CITY
DALLAS
LOS ANGELES
REVISED CATEGORY 3a: ACTUAL RATES, DOE ADJUSTED / CONSTANT WEATHER (CLEVELAND)

TABLE 5-9

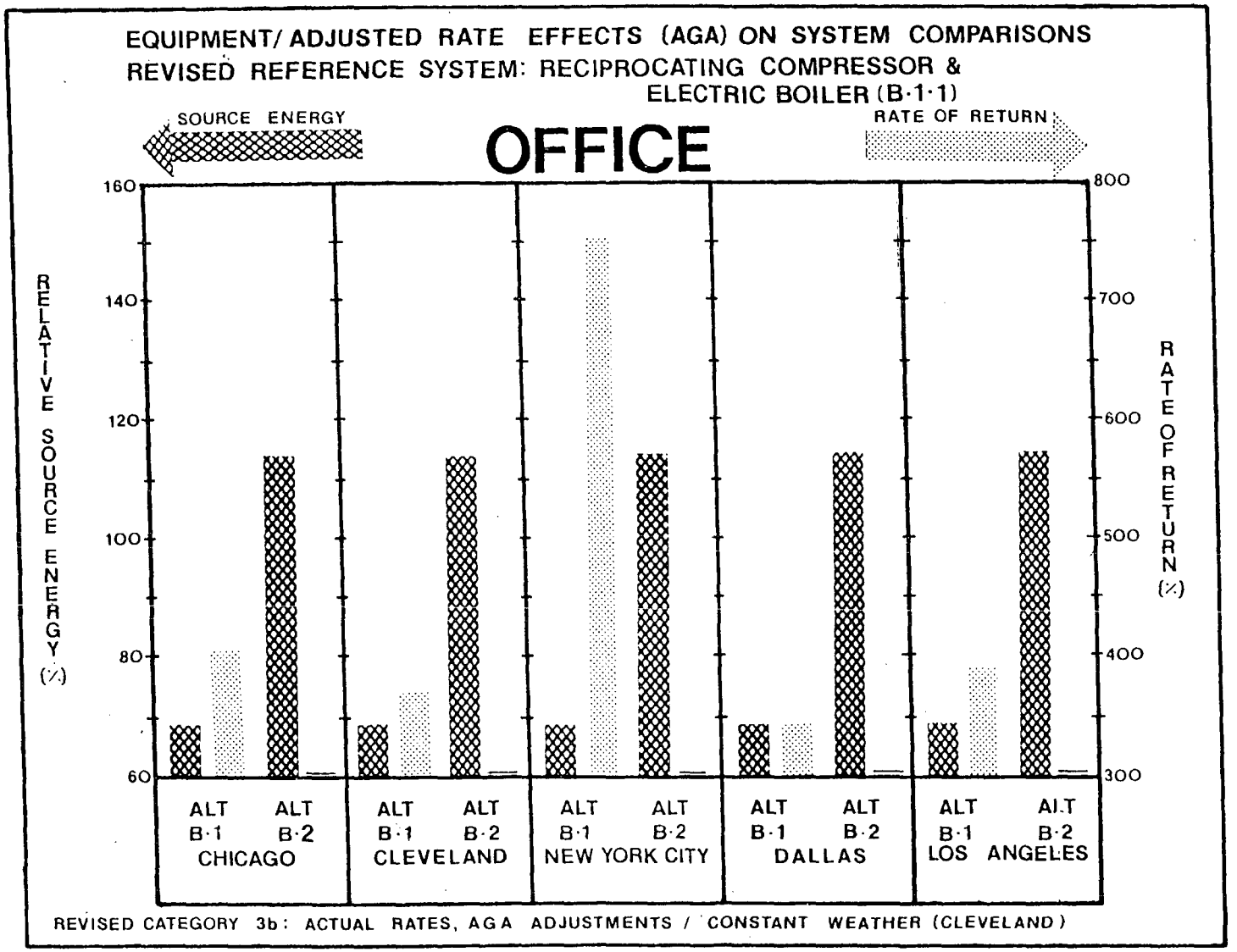

EQUIPMENT/ ADJUSTED RATE EFFECTS (AGA) ON SYSTEM COMPARISONS
REVISED REFERENCE SYSTEM: RECIPROCATING COMPRESSOR & ELECTRIC BOILER (B-1-1)
SOURCE ENERGY
OFFICE
RATE OF RETURN
RELATIVE SOURCE ENERGY (%)
RATE OF RETURN (%)
160
140
120
100
80
60
800
700
600
500
400
300
ALT B-1
ALT B-2
CHICAGO
CLEVELAND
NEW YORK CITY
DALLAS
LOS ANGELES
REVISED CATEGORY 3b: ACTUAL RATES, AGA ADJUSTMENTS / CONSTANT WEATHER (CLEVELAND)

TABLE 5-10

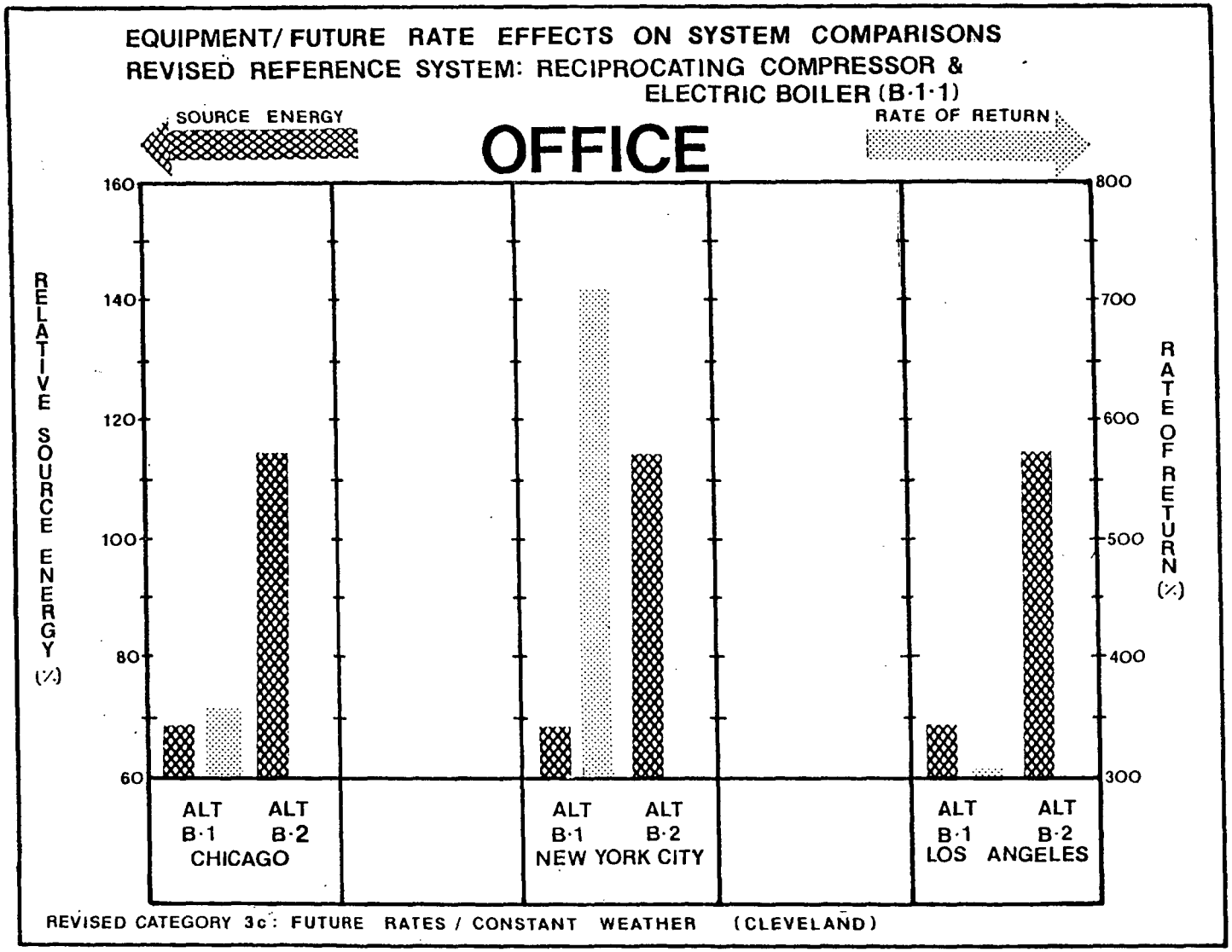

EQUIPMENT/ FUTURE RATE EFFECTS ON SYSTEM COMPARISONS
REVISED REFERENCE SYSTEM: RECIPROCATING COMPRESSOR & ELECTRIC BOILER (B·1·1)
SOURCE ENERGY
RATE OF RETURN
OFFICE
RELATIVE SOURCE ENERGY (%)
RATE OF RETURN (%)
160
140
120
100
80
60
800
700
600
500
400
300
ALT B·1
ALT B·2
CHICAGO
ALT B·1
ALT B·2
NEW YORK CITY
ALT B·1
ALT B·2
LOS ANGELES
REVISED CATEGORY 3c: FUTURE RATES / CONSTANT WEATHER (CLEVELAND)

TABLE 5-11

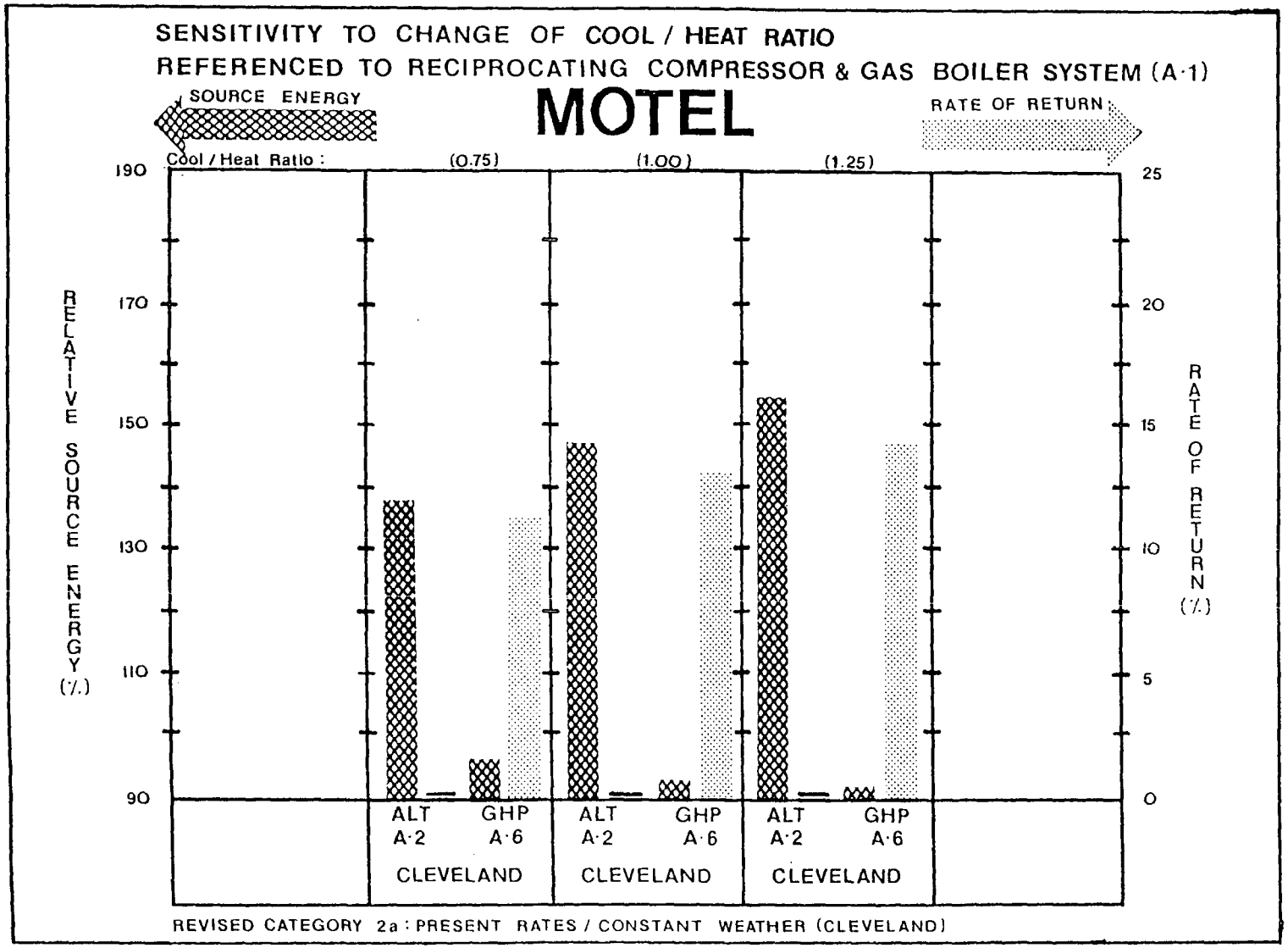

SENSITIVITY TO CHANGE OF COOL / HEAT RATIO
REFERENCED TO RECIPROCATING COMPRESSOR & GAS BOILER SYSTEM (A·1)
MOTEL
SOURCE ENERGY
RATE OF RETURN
Cool / Heat Ratio :
(0.75)
(1.00)
(1.25)
RELATIVE SOURCE ENERGY (%)
190
170
150
130
110
90
RATE OF RETURN (%)
25
20
15
10
5
0
ALT A·2
GHP A·6
CLEVELAND
REVISED CATEGORY 2a : PRESENT RATES / CONSTANT WEATHER (CLEVELAND)

TABLE 5-12

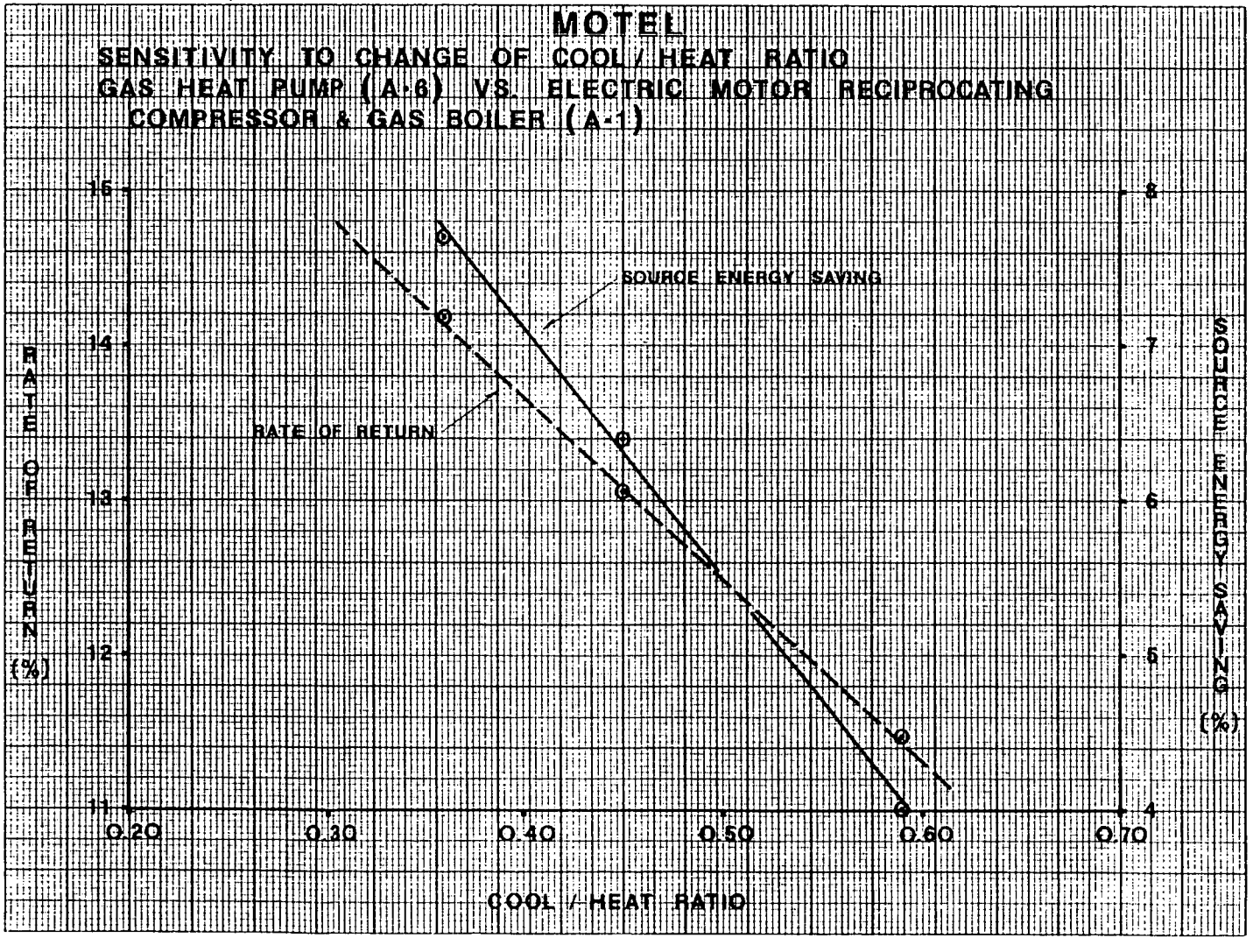

MOTEL
SENSITIVITY TO CHANGE OF COOL / HEAT RATIO
GAS HEAT PUMP (A-6) VS. ELECTRIC MOTOR RECIPROCATING
COMPRESSOR & GAS BOILER (A-1)
SOURCE ENERGY SAVING
RATE OF RETURN
RATE OF RETURN (%)
SOURCE ENERGY SAVING (%)
COOL / HEAT RATIO
16
14
13
12
11
8
7
6
5
4
0.20
0.30
0.40
0.50
0.60
0.70

TABLE 5-13

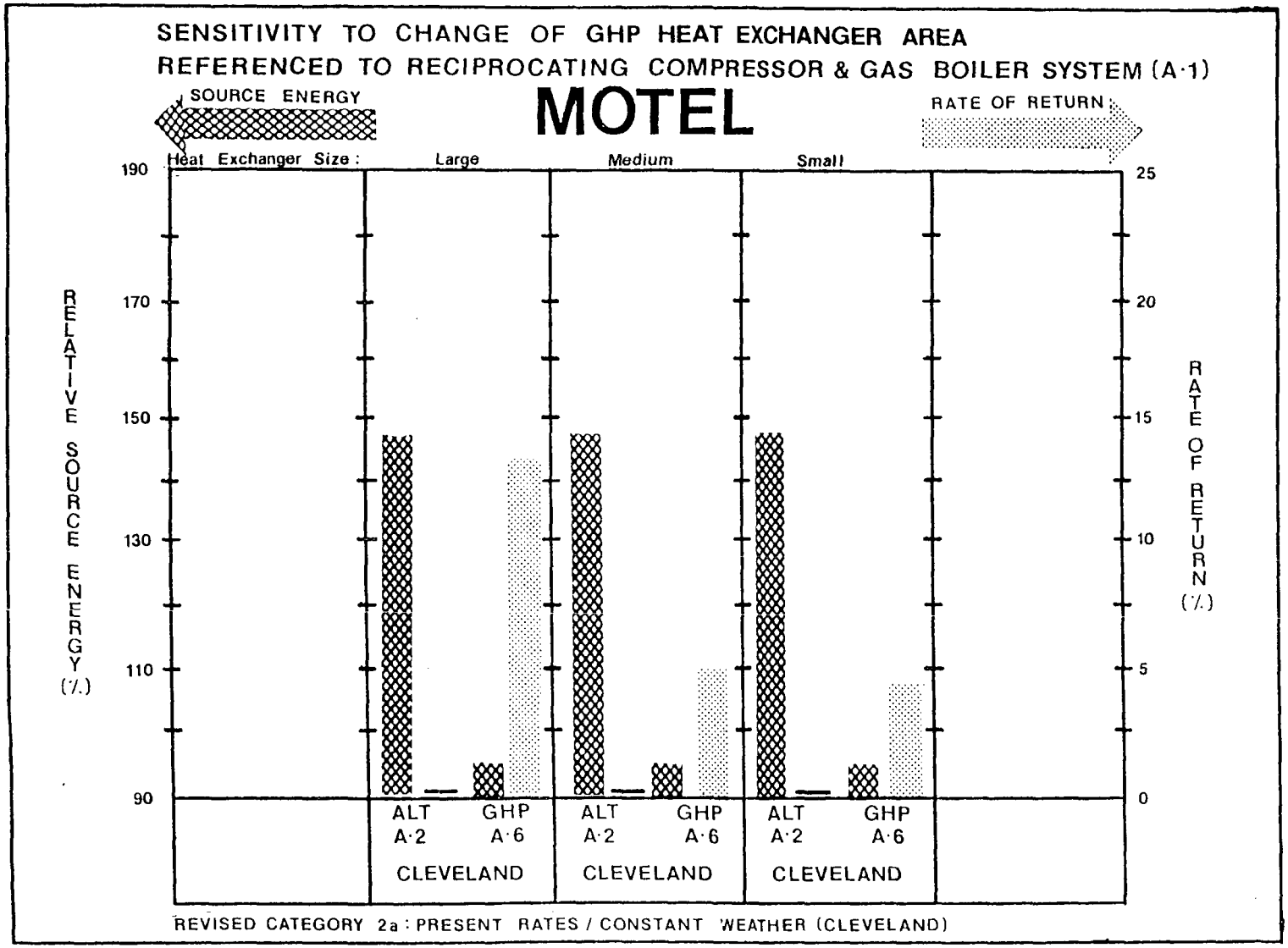

SENSITIVITY TO CHANGE OF GHP HEAT EXCHANGER AREA
REFERENCED TO RECIPROCATING COMPRESSOR & GAS BOILER SYSTEM (A·1)
MOTEL
SOURCE ENERGY
RATE OF RETURN
Heat Exchanger Size :
Large
Medium
Small
RELATIVE SOURCE ENERGY (%)
190
170
150
130
110
90
RATE OF RETURN (%)
25
20
15
10
5
0
ALT A·2
GHP A·6
CLEVELAND
REVISED CATEGORY 2a : PRESENT RATES / CONSTANT WEATHER (CLEVELAND)

TABLE 5-14

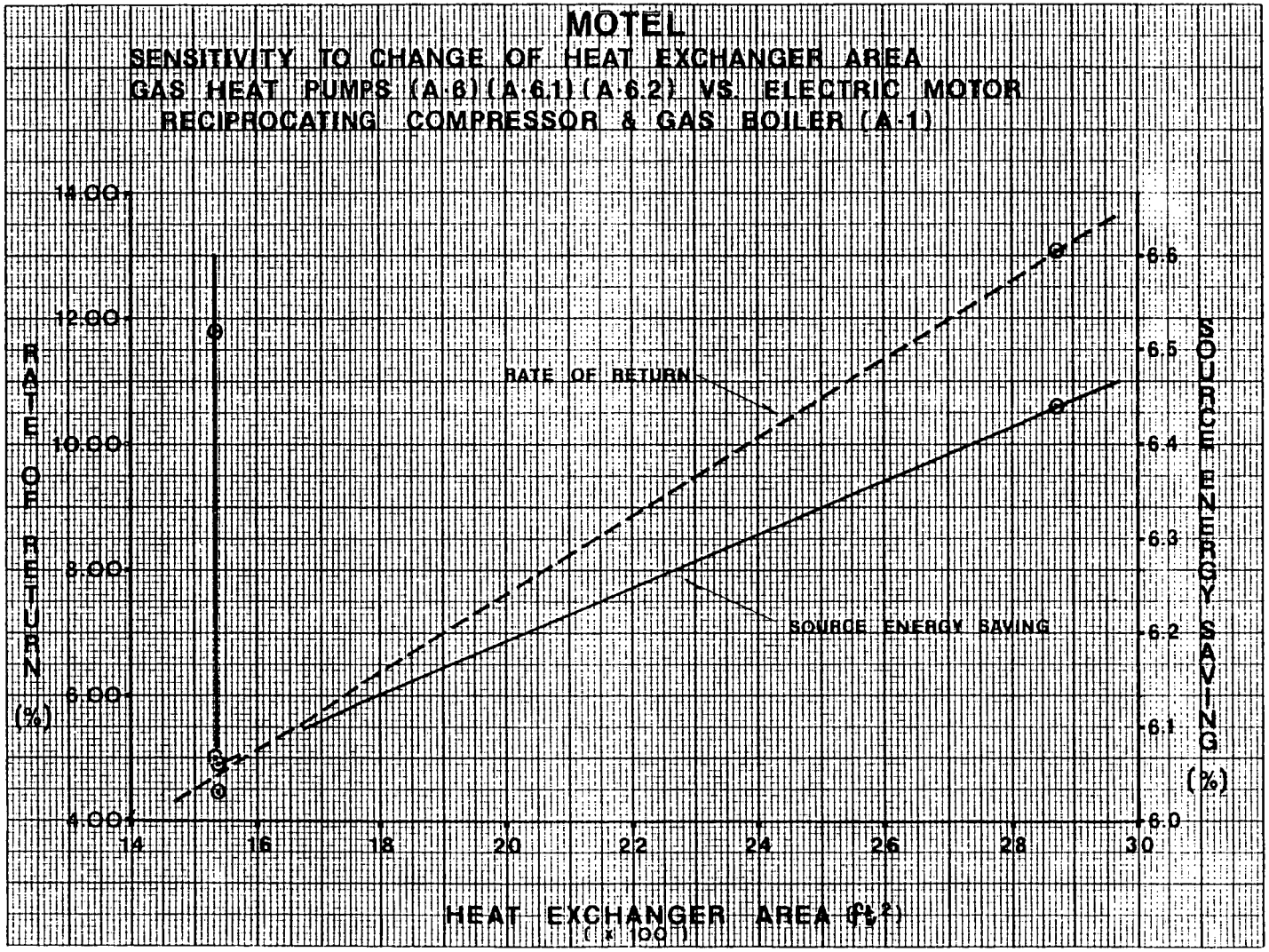

MOTEL
SENSITIVITY TO CHANGE OF HEAT EXCHANGER AREA
GAS HEAT PUMPS (A-6)(A-6.1)(A-6.2) VS. ELECTRIC MOTOR
RECIPROCATING COMPRESSOR & GAS BOILER (A-1)
RATE OF RETURN (%)
14.00
12.00
10.00
8.00
6.00
4.00
RATE OF RETURN
SOURCE ENERGY SAVING
SOURCE ENERGY SAVING (%)
6.6
6.5
6.4
6.3
6.2
6.1
6.0
14
16
18
20
22
24
26
28
30
HEAT EXCHANGER AREA (ft^2)
(x 100)

TABLE 5-15

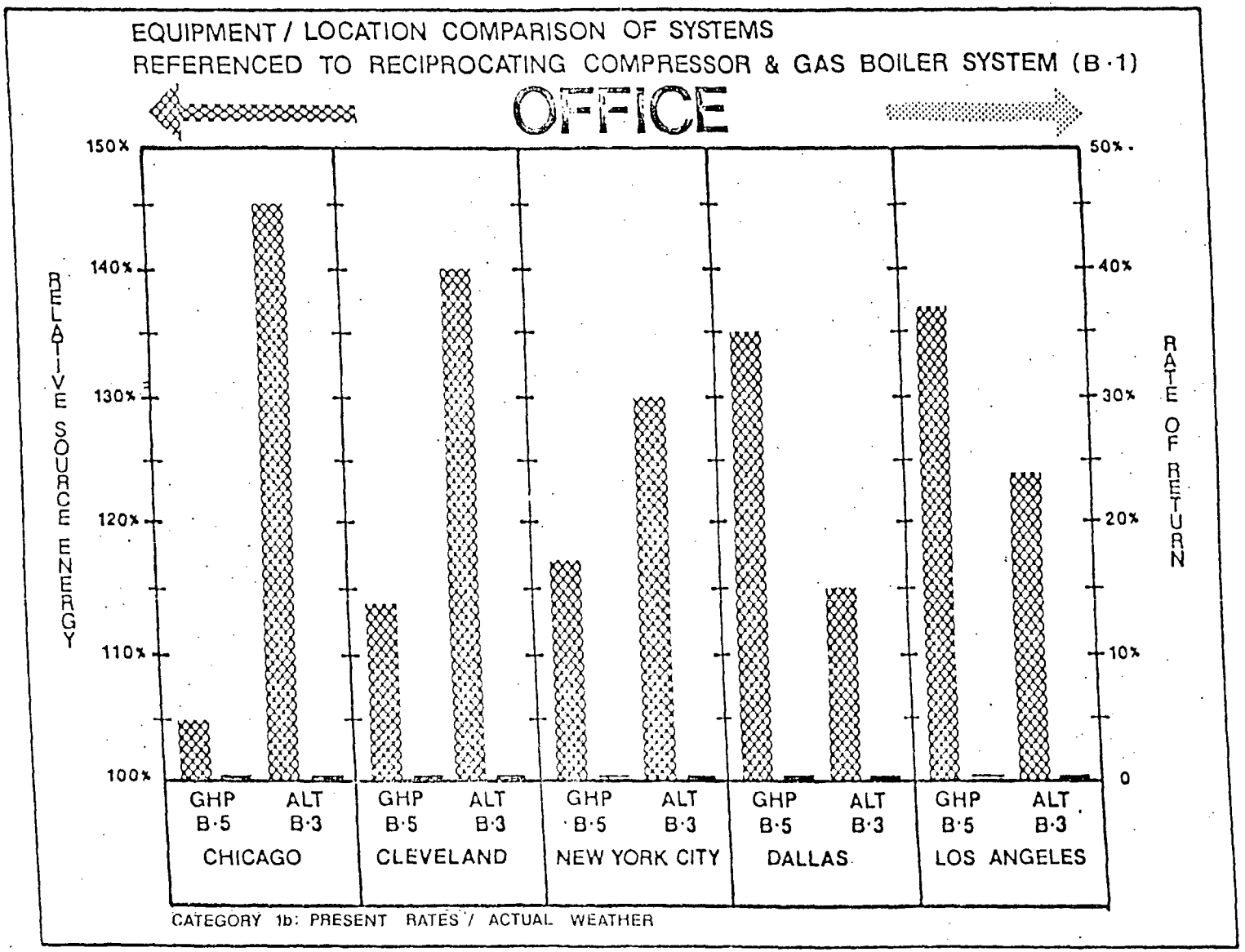

EQUIPMENT / LOCATION COMPARISON OF SYSTEMS
REFERENCED TO RECIPROCATING COMPRESSOR & GAS BOILER SYSTEM (B·1)
OFFICE
RELATIVE SOURCE ENERGY
150%
140%
130%
120%
110%
100%
RATE OF RETURN
50%
40%
30%
20%
10%
0
GHP B·5
ALT B·3
CHICAGO
CLEVELAND
NEW YORK CITY
DALLAS
LOS ANGELES
CATEGORY 1b: PRESENT RATES / ACTUAL WEATHER

TABLE 5-16

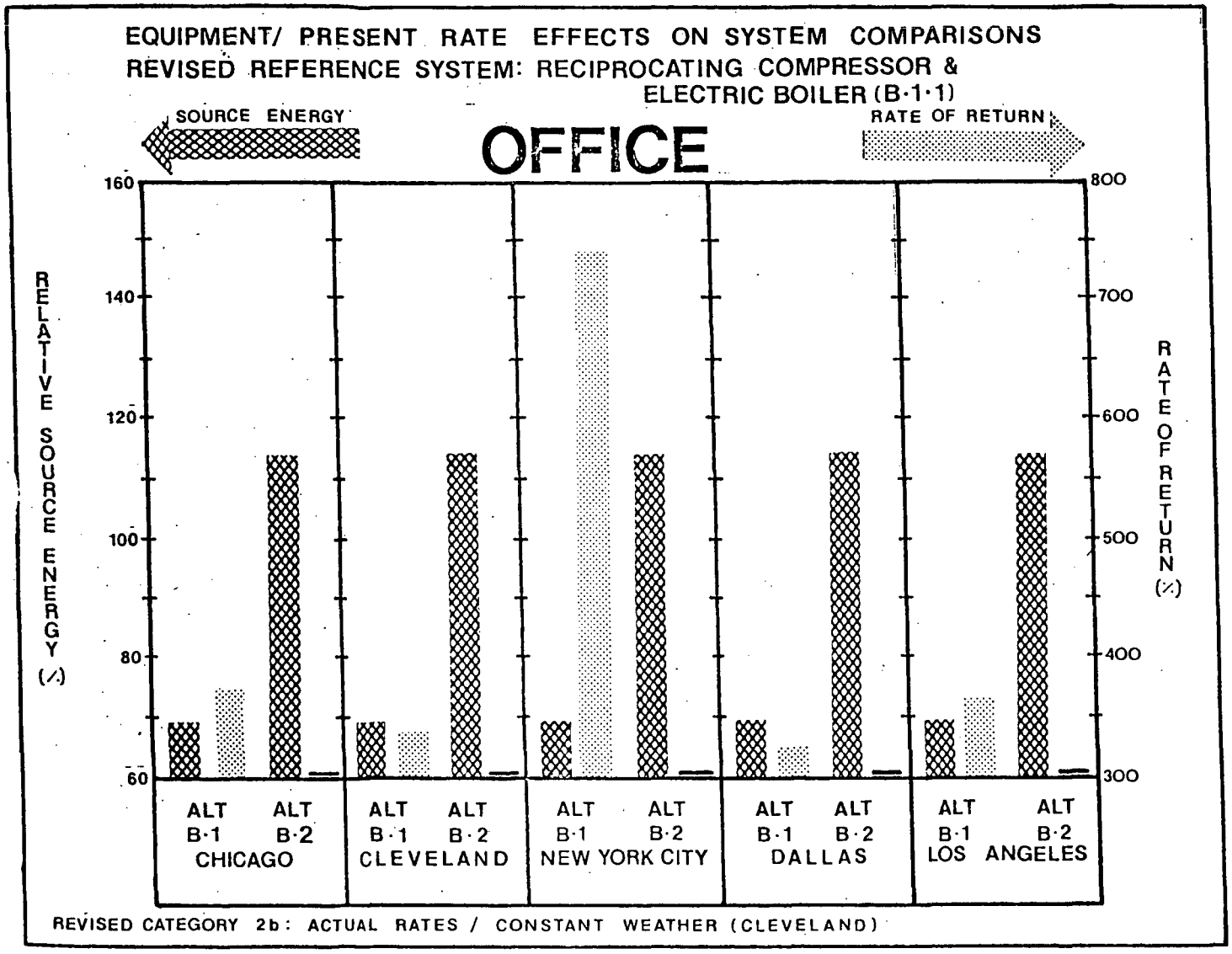

EQUIPMENT/ PRESENT RATE EFFECTS ON SYSTEM COMPARISONS
REVISED REFERENCE SYSTEM: RECIPROCATING COMPRESSOR & ELECTRIC BOILER (B·1·1)
SOURCE ENERGY
OFFICE
RATE OF RETURN
RELATIVE SOURCE ENERGY (%)
RATE OF RETURN (%)
160
140
120
100
80
60
800
700
600
500
400
300
ALT B·1
ALT B·2
CHICAGO
ALT B·1
ALT B·2
CLEVELAND
ALT B·1
ALT B·2
NEW YORK CITY
ALT B·1
ALT B·2
DALLAS
ALT B·1
ALT B·2
LOS ANGELES
REVISED CATEGORY 2b: ACTUAL RATES / CONSTANT WEATHER (CLEVELAND)

TABLE 5-17

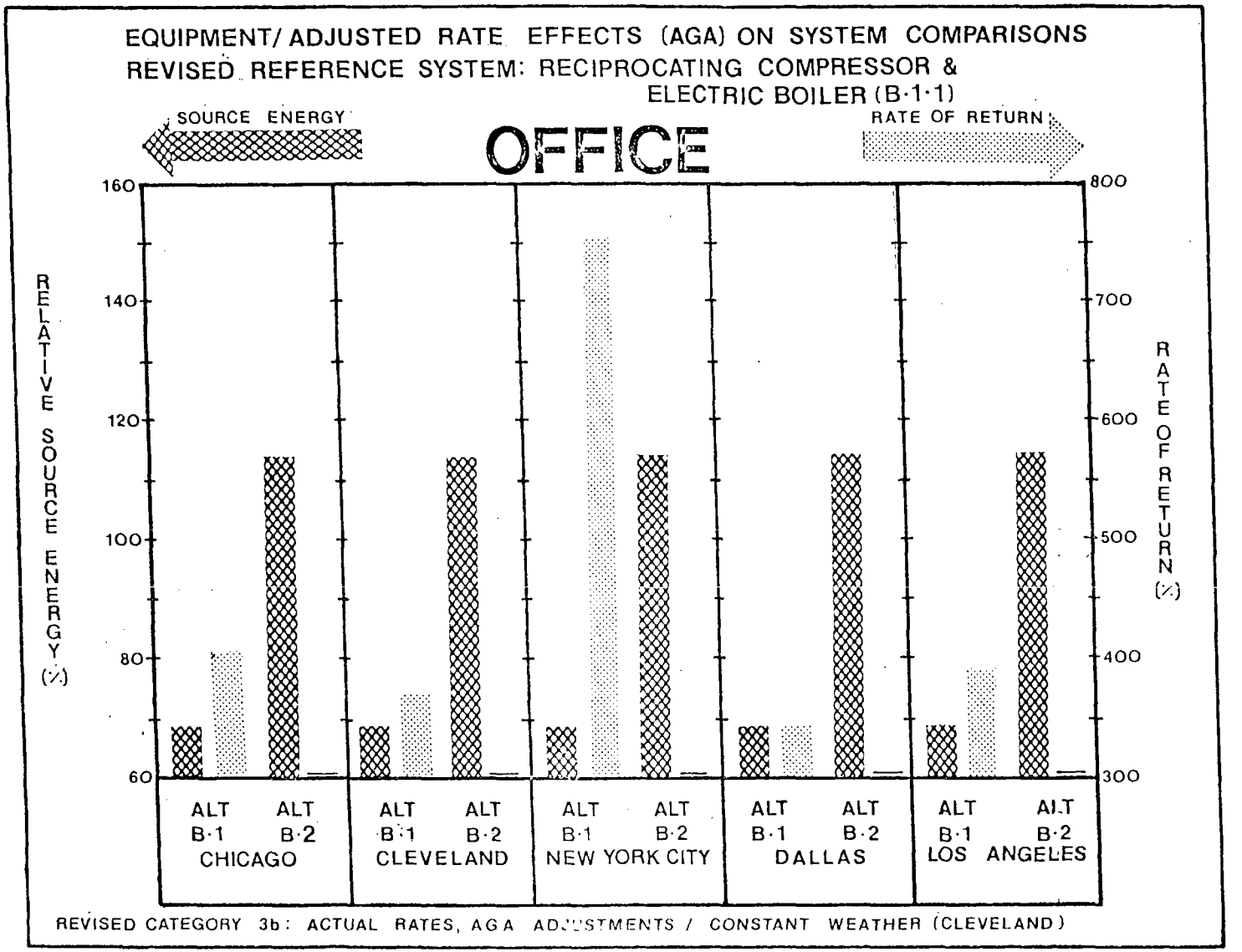

EQUIPMENT/ ADJUSTED RATE EFFECTS (AGA) ON SYSTEM COMPARISONS
REVISED REFERENCE SYSTEM: RECIPROCATING COMPRESSOR & ELECTRIC BOILER (B·1·1)
SOURCE ENERGY
OFFICE
RATE OF RETURN
RELATIVE SOURCE ENERGY (%)
RATE OF RETURN (%)
160
140
120
100
80
60
800
700
600
500
400
300
ALT B·1
ALT B·2
CHICAGO
CLEVELAND
NEW YORK CITY
DALLAS
LOS ANGELES
REVISED CATEGORY 3b: ACTUAL RATES, AGA ADJUSTMENTS / CONSTANT WEATHER (CLEVELAND)

TABLE 5-18

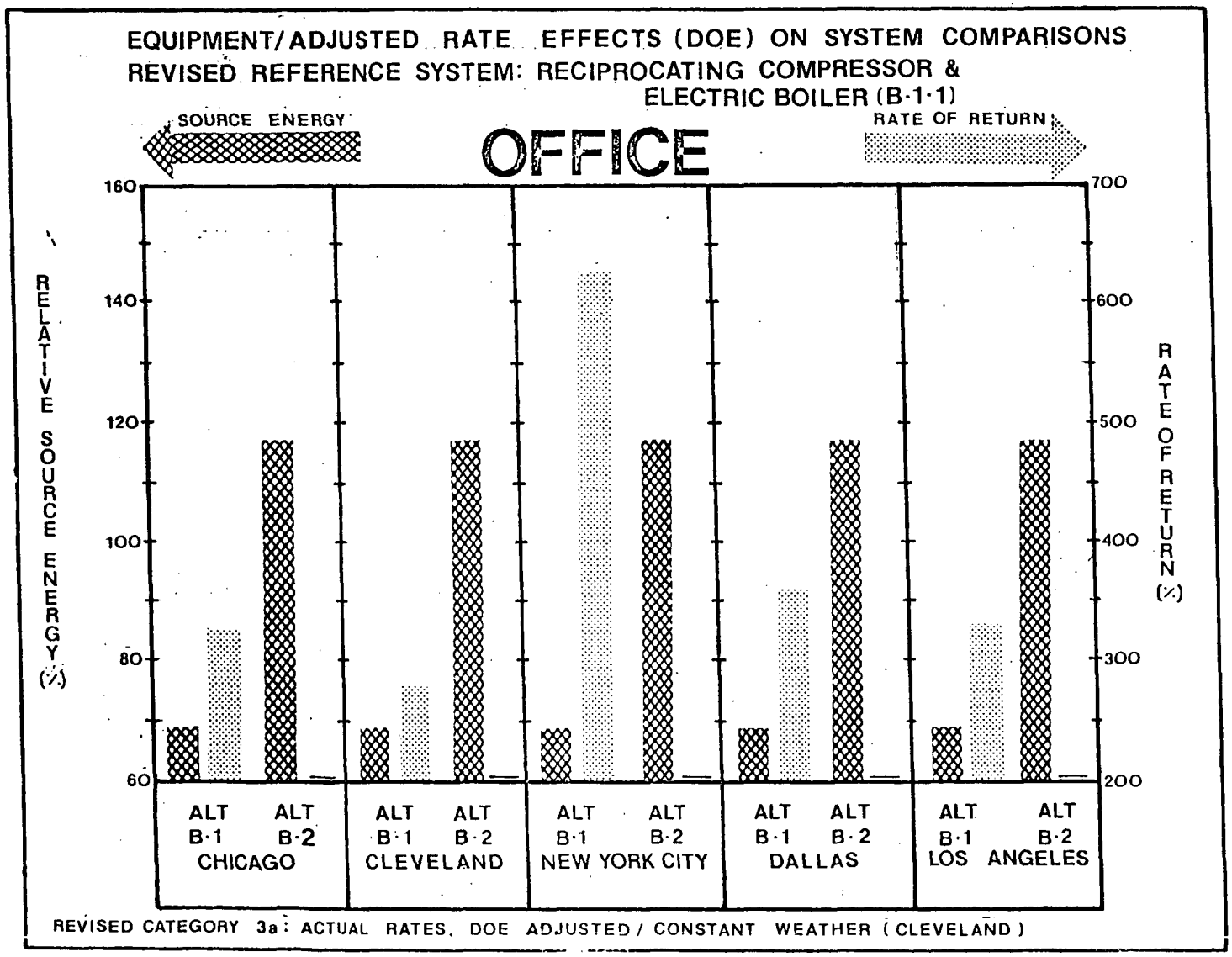
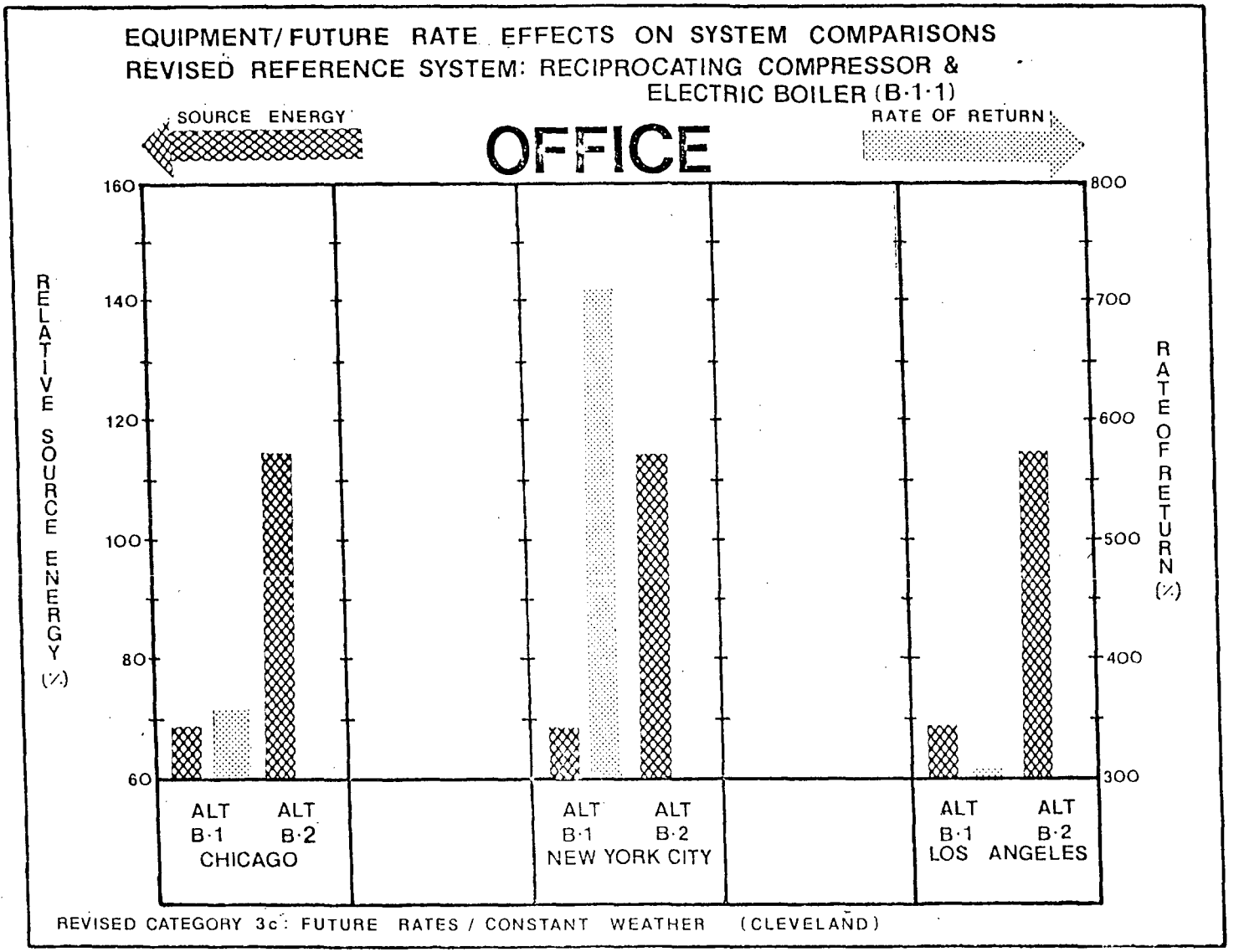

EQUIPMENT/ADJUSTED RATE EFFECTS (DOE) ON SYSTEM COMPARISONS
REVISED REFERENCE SYSTEM: RECIPROCATING COMPRESSOR & ELECTRIC BOILER (B-1-1)
SOURCE ENERGY
OFFICE
RATE OF RETURN
RELATIVE SOURCE ENERGY (%)
RATE OF RETURN (%)
160
140
120
100
80
60
700
600
500
400
300
200
ALT B-1
ALT B-2
CHICAGO
ALT B-1
ALT B-2
CLEVELAND
ALT B-1
ALT B-2
NEW YORK CITY
ALT B-1
ALT B-2
DALLAS
ALT B-1
ALT B-2
LOS ANGELES
REVISED CATEGORY 3a: ACTUAL RATES, DOE ADJUSTED / CONSTANT WEATHER (CLEVELAND)

TABLE 5-19


EQUIPMENT/FUTURE RATE EFFECTS ON SYSTEM COMPARISONS
REVISED REFERENCE SYSTEM: RECIPROCATING COMPRESSOR & ELECTRIC BOILER (B·1·1)
SOURCE ENERGY
OFFICE
RATE OF RETURN
RELATIVE SOURCE ENERGY (%)
160
140
120
100
80
60
RATE OF RETURN (%)
800
700
600
500
400
300
ALT B·1
ALT B·2
CHICAGO
ALT B·1
ALT B·2
NEW YORK CITY
ALT B·1
ALT B·2
LOS ANGELES
REVISED CATEGORY 3c: FUTURE RATES / CONSTANT WEATHER (CLEVELAND)

6.0 SOURCE ENERGY CONSUMPTION TABLES (Tables 6-1 through 6-4)

TABLE 6-1

BASE STUDY

Key

Gas	Elec.
Total	

SOURCE ENERGY CONSUMPTION (MMBTU)
MOTEL

	A-1		A-2		A-5		A-6	
Chicago	5,896	5,554	0	17,784	9,648	1,420	9,624	915
	11,450		17,784		11,068		10,539	
Cleveland	5,041	5,782	0	15,978	9,149	1,508	9,123	1,003
	10,823		15,978		10,657		10,126	
New York City	4,140	5,764	0	13,905	8,611	1,477	8,581	961
	9,904		13,905		10,088		9,542	
Dallas	2,501	7,244	0	11,722	8,561	2,620	8,518	2,189
	9,745		11,722		11,181		10,707	
Los Angeles	1,925	6,323	0	9,029	7,564	2,000	7,538	1,517
	8,248		9,029		9,564		9,055	

Chicago	(A-1) Base
A-2	155%
A-5	97%
A-6	92%

Cleveland	(A-1) Base
A-2	148%
A-5	98%
A-6	94%

NYC	(A-1) Base
A-2	140%
A-5	102%
A-6	96%

Dallas	(A-1) Base
A-2	120%
A-5	115%
A-6	110%

Los Angeles	(A-1) Base
A-2	109%
A-5	116%
A-6	110%

TABLE 6-2

BASE STUDY

SOURCE ENERGY CONSUMPTION (MMBTU)
OFFICE

	B-1		B-2		B-3		B-4		B-5	
Chicago	3,215	1,842	0	8,552	0	7,369	7,021	-1,201	6,990	-1,669
	5,057		8,552		7,369		5,820		5,321	
Cleveland	2,895	1,827	0	7,731	0	6,624	6,828	-1,186	6,798	-1,654
	4,722		7,731		6,624		5,642		5,144	
New York City	2,422	1,955	0	6,873	0	5,679	6,671	-1,055	6,640	-1,508
	4,377		6,873		5,679		5,616		5,132	
Dallas	1,430	2,681	0	5,393	0	4,709	6,192	-261	6,157	-626
	4,111		5,393		4,709		5,931		5,531	
Los Angeles	1,501	2,411	0	5,402	0	4,858	6,692	-833	6,644	-1,268
	3,912		5,402		4,858		5,859		5,376	

Chicago	(B-1) Base
B-2	169%
B-3	145%
B-4	115%
B-5	105%

Cleveland	(B-1) Base
B-2	163%
B-3	140%
B-4	119%
B-5	109%

NYC	(B-1) Base
B-2	157%
B-3	130%
B-4	128%
B-5	117%

Dallas	(B-1) Base
B-2	131%
B-3	115%
B-4	144%
B-5	135%

Los Angeles	(B-1 Base)
B-2	138%
B-3	124%
B-4	150%
B-5	137%

TABLE 6-3

KEY

GAS	ELEC.
TOTAL	

SOURCE ENERGY CONSUMPTION (MMBTU)
MOTEL
EXTENSION STUDY

	A-1		A-2		A-6		A-6.1		A-6.2	
CLEVELAND 0.45 HEAT/COOL [1.00]	5041	5782	0	15978	9123	1003				
	10823 (1.0)		15978 (1.0)		10,126 (1.0)					
CLEVELAND 0.59 HEAT/COOL [0.75]	3897	5782	0	13424	8226	1070				
	9679 (0.89)		13424 (0.84)		9296 (0.92)					
CLEVELAND 0.36 HEAT/COOL [1.25]	6222	5782	0	18537	10117	967				
	12004 (1.11)		18537 (1.16)		11084 (1.09)					
CLEVELAND LARGE HEAT EXCHANGER	5041	5782	0	15978	9123	1003				
	10823 (1.0)		15978 (1.0)		10126 (1.0)					
CLEVELAND MEDIUM HEAT EXCHANGER	3897	5782	0	13424			9105	1012		
	9678 (0.89)		13424 (0.84)				10117 (0.99)			
CLEVELAND "SMALL" HEAT EXCHANGER	6222	5782	0	18537					9109	1058
	12004 (1.11)		18537 (1.16)						10167 (0.99)	

NOTE: ( ) Indicates normalized annual energy consumption relative to normalized heat/cool ratio.

[ ] Indicates normalized heat/cool ratio where 1.0 equals 0.45

TABLE 6-4

SOURCE ENERGY CONSUMPTION (MMBTU)
OFFICE
EXTENSION STUDY

KEY

GAS	ELEC
TOTAL	

	B-1		B-1.1		B-2		B-3		B-4		B-5	
CHICAGO	3,215	1,842			0	8,552	0	7,369	7,021	-1,201	6,990	-1,669
	5,057				8,552		7,369		5,820		5,321	
CLEVELAND	2,895	1,827	0	7,305	0	7,731	0	6,624	6,828	-1,186	6,798	-1,654
	4,722		7,305		7,731		6,624		5,642		5,144	
NEW YORK CITY	2,422	1,955			0	6,873	0	5,679	6,671	-1,055	6,640	-1,508
	4,377				6,873		5,679		5,616		5,132	
DALLAS	1,430	2,681			0	5,393	0	4,709	6,192	-261	6,157	- 626
	4,111				5,393		4,709		5,931		5,531	
LOS ANGELES	1,501	2,411			0	5,402	0	4,848	6,692	-833	6,644	-1,268
	3,912				5,402		4,858		5,859		5,376	

CHICAGO	(B-1)Base
B-2	169%
B-3	145%
B-4	115%
B-5	105%

CLEVELAND	(B-1) Base
B-1.1	155%
B-2	163%
B-3	140%
B-4	119%
B-5	109%

NYC	(B-1) Base
B-2	157%
B-3	130%
B-4	128%
B-5	117%

DALLAS	(B-1) Base
B-2	131%
B-3	115%
B-4	144%
B-5	135%

LOS ANGELES	(B-1) Base
B-2	138%
B-3	124%
B-4	150%
B-5	137%

7.0 KEY OBSERVATIONS

7.1 Motel - Base Study - Exhibit #7

- The motel appears to be a more favorable application than the office building.
- New York City is a good application for the electrically coupled gas heat pump. (A-6)
  - Lower source energy consumption than base system (Cleveland)
  - Substantial operating cost savings
  - 31% rate of return with present rates and actual weather
- The gas heat pump looks best with future rates and AGA rate-level projections, in that order.
- The application of present rates along and with DOE rate-level projections yields about the same results for the gas heat pump.
- The best energy cost savings is in New York; followed by Cleveland, Chicago, and Dallas. Los Angeles shows the lowest energy cost savings.
- Source energy consumption savings of the gas heat pump exceeds the reciprocating compressor and gas boiler system in Chicago, Cleveland and New York.

7.2 Office - Base Study - Exhibit #8

- The office building is not a favorable application for the gas heat pump.
- The reciprocating chiller and gas boiler (system B-1) shows the lowest source energy consumption of all systems. The gas heat pump system (B-5) is the second lowest source energy system, except for system B-3 (close loop electric heat pump) in Dallas and Los Angeles.
- The electric-drive gas heat pump is the best in all cities versus the mechanical drive gas heat pump. The electric-drive gas heat pump (A-6) shows utility energy cost savings over all other systems in all cities and for all rate projections.

- The energy cost savings of the electric-drive gas heat pump are insufficient to yield a positive rate of return, except in New York City, with future rate schedules where there is only 5% rate of return.
- The best energy cost saving is in New York City; followed by Chicago and then Cleveland. Dallas and Los Angeles show very small savings.
- Source energy consumption of the gas heat pump almost equals the reciprocating compressor and gas boiler system in Chicago, Cleveland and New York.

7.3 Motel - Extension Study - Cooling Load to Heating Load Ratio Sensitivity

- A lower cool/heat ratio shows an improved (higher) rate of return for the gas heat pump when compared with the reciprocating compressor and gas boiler system.
- Higher source energy savings for the gas heat pump results when the motel cool/heat ratio is lowered. The comparision is again made with the reciprocating compressor and gas boiler system.

7.4 Motel - Extension Study - Sensitivity to Change of GHP Heat Exchanger Area

- Increased rate of return results when the gas heat pump is equipped with larger heat exchanger area and compared with the reciprocating compressor and gas boiler system.
- Increased source energy savings result when the gas heat pump is equipped with larger heat exchanger area and compared with the reciprocating compressor and gas boiler system.

7.5 Office - Extension Study - Revised Reference System Study: Reciprocating Compressor & Electric Boiler (Reference) Versus Reciprocating Compressor & Gas Boiler

- The relatively small additional cost of the electric boiler system is offset by high annual utility cost savings resulting

in very high rates of return for the gas boiler system in all weather areas.

- The application of lower (promotional or special) electric rates would be necessary to enable the electric boiler system to be competitive with the gas boiler system under the conditions of the study.

8.0 PROJECTED REAL INCREASES IN COMMERCIAL GAS AND ELECTRIC PRICES, 1979 - 1985

TABLE 8-1

Projected Real Increases In
Commercial Gas and Electric Prices
1979 - 1985

DEPARTMENT OF ENERGY*

City/Region	Gas (1978 $)		Electric (1978 $)	
	% Change Per Year	% Change 1979-85	% Change Per Year	% Change 1979-85
1. CHI/Midwest	6.8	48.5	1.0	6.2
2. CLE/North Central	9.1	71.8	1.5	9.8
3. NYC/NY-NJ	3.9	25.0	-1.0	-6.4
4. DAL/Southwest	8.7	65.5	4.0	27.1
5. LAX/West	7.9	57.5	1.3	8.2

AMERICAN GAS ASSOCIATION**

City/Region	Gas (1979 $)		Electric (1979 $)	
	% Change Per Year	% Change 1979-85	% Change Per Year	% Change 1979-85
1. CHI/E. North Central	1.2	7.4	1.3	8.0
2. CLE/E. North Central	1.2	7.4	1.3	8.0
3. NYC/Middle Atlantic	-0.4	-2.0	-0.17	-0.90
4. DAL/W. South Central	4.3	29.0	2.1	13.3
5. LAX/Pacific	1.3	8.1	1.0	6.4

*Source: Systems Analysis Branch, Office of Bldgs. & Community Systems, Conservation & Solar Applications. Chief Systems Analysis Branch, Peter P. Bach, March 27, 1979.

**Source: Planning & Analysis Group, American Gas Association, Manager, Demand Analysis, Richard Itteilag, March 27, 1979.

PEC
4/17/79

TABLE 9-1

DESCRIPTION OF EQUIPMENT SYSTEM

ECONOMY MOTEL - ONE (1) STORY

BUILDING MODEL A - 120 TR NOMINAL COOLING CAPACITY

OPTION NUMBER	PRIMARY SIDE		TERMINAL (SECONDARY) SIDE					
	CHILLER/COOLER	BOILER/HEATER	PRINCIPAL AIR HANDLING		SUPPLEMENTARY HEATING OR COOLING	COOLING TOWER OR OUTDOOR CONDENSER	PROCESS HEATER TYPE	OUTDOOR AIR ECONOMIZER
			FAN-COIL	VAV				
A-1	Electric Motor Reciprocating Compressor Chiller Carrier Model Series 30	Gas Boiler	4-Pipe Perimeter	No	No	Cooling Tower	Gas-Fired Commercial Hot Water	No
A-2	Electric Motor Reciprocating Compressor Chiller Dbl. Bundle Cond. Carrier Model Series 30 Hr.	Electric Boiler	4-Pipe Perimeter	No	No	Cooling Tower	Electric Boiler Commercial Hot Water	No
A-5	L.S.M. Gas Heat Pump Direct-Fired Steam Generator/Turbine-Fresh Gent. Comp. Mechanical Drive	Steam/Hot Water Heat Exchange (Self-Contained)	4-Pipe Perimeter	No	Optional Htg. Hot Water Heater Optional Suppl. Absorption Chiller	Cooling Tower	Turbine Exhaust	No
A-6, A-6.1 and A-6.2	L.S.M. Gas Heat Pump (Same as Above) Electrical Drive	Same as Above	4-Pipe	No	Optional Htg. Hot Water Heater Optional Suppl. Absorption Chiller	Cooling Tower	Same as Above	No

TABLE 9-2

DESCRIPTION OF EQUIPMENT SYSTEMS
GENERAL OFFICE BUILDING - SIX (6) STORY
BUILDING MODEL B - 120 TR NOMINAL COOLING CAPACITY

OPTION NUMBER	PRIMARY SIDE		TERMINAL (SECONDARY) SIDE					
	CHILLER/COOLER	BOILER HEATER	PRINCIPAL AIR HANDLING		HEATING DISTRIBUTION	COOLING TOWER OR OUTDOOR CONDENSER	PROCESS HEATER TYPE	OUTSIDE AIR ECONOMIZER
			FAN-COIL	VAV				
B-1, B-1.1*	Electric Motor - Reciprocating Comp. Carrier 30 Series Chiller	Gas Boiler for Htg. Hot Water	Three Package Air Handling Units 4-Pipe	Yes	Baseboard Radiation	Cooling Tower	Gas Boiler Commercial Hot Water	YES
B-2	Electric Motor - Reciprocating Comp. Double Bundle Cond. Carrier	Electric Boiler for Htg. Hot Water	Same as Above 4-Pipe	Yes	Perimeter Fan-Coil	Cooling Tower	Electric Boiler Commerical Hot Water	No Water Storage
B-3	Electric Motor - Closed Loop Water Air Heat Pump	Electric Boiler for Htg. Hot Water	Yes (Included in Pkg.)	No	(Included in Pkg.)	Cooling Tower	Electric Boiler Commercial Hot Water	No
B-4	L.S.M. Gas Heat Pump Direct-fired Steam Generator-Turbine/ Centrifugal Comp. Mechancial Drive	Self-Contained Heat Exchangers for Htg. Hot Water	Three Package Air Handling Units 4-Pipe	Yes	Perimeter Fan-Coil	Cooling Tower	Turbine Exhaust Steam Bleed and Supplemental Gas-Fired Commercial Hot Water Heater	Yes
B-5	L.S.M. Gas Heat Pump Direct-Fired Steam Generator-Turbine/ Centrifugal Comp. Electrical Drive	Same as Above	Same as Above 4-Pipe	Yes	Perimeter Fan-Coil	Cooling Tower	Same as Above	Yes

*B-1.1 -- Same as Option Number B-1 except for substitution of Electric Boiler for Gas Boiler.

TABLE 10-1

LSM GAS HEAT PUMP COMPARATIVE COST OF OWNERSHIP STUDY
SUMMARY OF INITIAL INSTALLED COSTS

System I.D.	HVAC System Cost	Associated Electrical Cost, Gas Piping & Flue Cost	Alternate System Total Installed Cost	Annual Levelized Maintenance & Replacement Cost	Primary Equipment Cost (Chiller, Boiler, Tower, Pump Costs, - Central Systems Systems Only(1)	GHP Premium Percentage - Applied to Systems A-2(5) And B-2(6) Primary Equipment Cost 50% = GHP Primary Equipment Cost	Electrical Cost Deduction For Gas Heat Pump Systems Only	Total Installed Cost - All Systems *(GHP Adjusted By + Premium & - Elec. Deduct Applied to A-2 & B-2 Total Costs	
Motel									
A-1	$292,000	$23,000	$315,000	$6,500	---	---	---	A-1	$315,000
A-2	300,200	26,000	326,200	7,300	55,335(2)	---	---	A-2	326,200
A-5	---	---	---	7,300	---	+$27,668	-$8,000	A-5	345,868*
A-6	---	---	---	7,300	---	+ 27,668	- 8,000	A-6	345,868*
Office									
B-1	$205,365	$29,700(4)(5)	$235,065	$6,500	---	---	---	B-1	$235,065
B-2	283,500	32,000	315,500	7,300	45,081(3)	---	---	B-2	315,500
B-3	227,000	32,000	259,000	6,300	N/A	---	---	B-3	259,000
B-4	---	---	---	7,300	---	+$22,541	-$8,000	B-4	330,041*
B-5	---	---	---	7,300	---	+ 22,541	- 8,000	B-5	330,041*
B-1.1	207,900	25,000(6)	232,900	6,500	---	---	---	B-1.1	232,900

(1) Based on Cleveland Building.
(2) System A-2 Primary Equipment Cost - Double Bundle Condenser Chiller, Electric Boiler, Cooling Tower and CW Pump
(3) System B-2 Primary Equipment Cost - Double Bundle Condenser Chiller, Electric Boiler, Cooling Tower and CW Pump
(4) Electrical Contract Deduction (Smaller Power Center and Power Wiring) - 400 Amps X $20/Amp = $8,000.
(5) Includes $4,700 for flue and gas piping.
(6) Assumed value to reduce cost of System B-1.1 below System B-1.

11.0 ADDENDUM

11.1 Summary of the Energy System Analysis Series

The Energy System Analysis Series is a library of computer programs developed by Ross F. Meriwether and Associates, Inc., for hour-by-hour calculation of the annual energy consumption of various types of air-side systems and mechanical plants, for applying local utility rate schedules to these demands and consumptions, and for combining these costs with other owning and operating costs for year-by-year cashflow projections. Each major step in a complete energy system analysis is handled by a different program, thereby permitting the engineer to evaluate the results of one part before finalizing inputs and proceeding with the next part. The various programs permit the user to evaluate different airside system types, various control temperatures, airflow quantities, operating schedules, heat recovery or economizer cycles, various equipment types and accessory combinations, competing energy sources, and alternate utility rates.

As shown on the schematic flow diagram (Figure 11-1), the five programs in the library are:

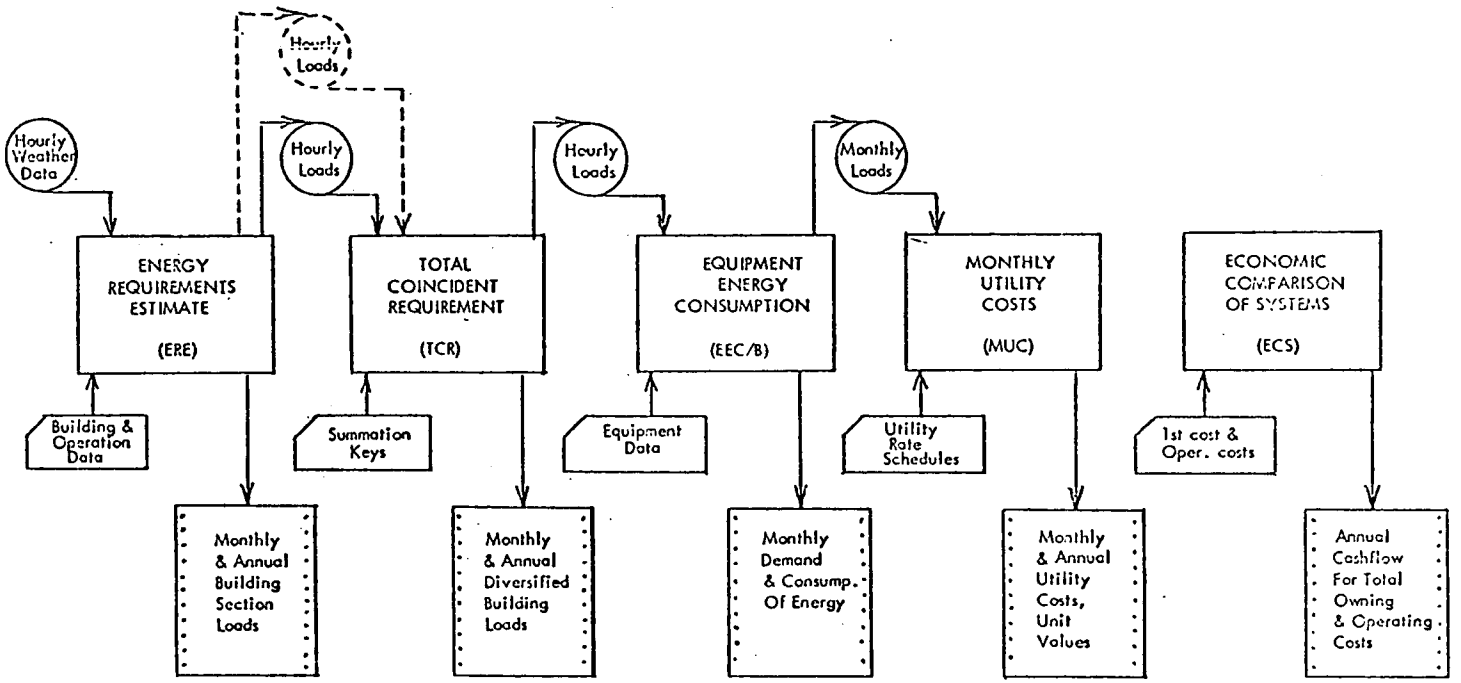
Energy Requirements Estimate (called ERE) - a program to calculate hour-by-hour thermal and electrical loads for a building (or building section) and to simulate the operation of the air distribution system in meeting these loads.

Total Coincident Requirement (called TCR) - a program to sum the hour-by-hour loads from multiple ERE runs for various buildings or sections to find total system loads with actual diversity. (Not utilized)

Equipment Energy Consumption/B (called EEC/B) - a program to simulate the operation of the various pieces of equipment as they respond to loads imposed by the building's air-side systems to find monthly and annual energy consumption for the various systems being evaluated.

Monthly Utility Costs (called MUC) - a program to calculate the monthly and annual energy costs for each system using the local utility rate schedules.

Economic Comparision of Systems (called ECS) - a program to calculate the annual cashflow for total owning and operating costs using first cost and operating costs.



Source: Ross F. Meriwether & Associates, Inc
1600 N. E. Loop 410, Suite 241
San Antonio, Texas 78209

Fig. 11-1 The Energy System Analysis Series

11.2 General Description of General Investment Analysis Program

The General Investment Analysis Computer Program creates a Detailed Investment Profile and a Book Expense Profile for each of up to four (4) Alternatives.

For each year of the analysis, the profile consists of year-end totals of:

Investment

Capital Required (Initial Investment), Salvage Value, Depreciable Amount, Principal Payment, Outstanding Capital

Book Expenses

Book Depreciation, Debt Interest, Cost of Equity (when less than 100% debt financed), State/Local Property Taxes, Insurance, Labor, Fuel, Maintenance, Electrical Power, Miscellaneous Expense, Net Book Expenses, Net Cash Flow Out, Present Worth Factor at Selected Rate, Present Worth of Net Cash Flow Out, Total Present Worth of Net Cash Flow Out

The Total Present Worth of Net Cash Flow Out is calculated at a selected discounting rate for each alternative. The alternative having the lowest Total Present Worth of Net Cash Flow Out is considered to be the "best" alternative.

The program calculates the Annual and Total Net Cash Flow Out over the Life of the Investment, a Loan Repayment Schedule, a detailed Tax Calculation Schedule and the Discounted Rate of Return on the Differential Cash Flow (Savings) between the designated Base Investment and the selected Alternative Investments. The model can handle up to three Phased Investments per alternative.

The facility to inflate selected operating costs and expenses is provided. This option permits realistic studies in which such costs as maintenance, labor and fuel increase over the life of the study. The model can handle a maximum study length of thirty (30) years.

Depreciation can be calculated in three (3) different ways: Straight Line (STL); Sum-of-the-Year Digits (SYD); Double Declining Balance (DDB). The

depreciation calculations can be executed differently for tax purposes, as opposed to book accounting, if desired.

If the starting date is not current, the model has the ability to inflate the data to today's values using the entered inflation rate.

11.3 Comparative Cost of Ownership Study for the Large Size Model Gas Heat Pump

A flow diagram for computer programs, as shown in Figure 11-2, was the format followed for testing the large-size model gas heat pump in an office building in Cleveland. The results of both the Base Study and the Extension Study are shown on the following computer printouts:

Base Study	
Solar Tables	- Tables 11-1 through 11-16
Zone Thermal Loads	- Tables 11-17 through 11-20
Design Point Requirements	- Tables 11-21 through 11-22
Energy Requirements Estimates	
Variable Air Volume, No Economizer	- Tables 11-23 through 11-33
Variable Air Volume, with Economizer	- Tables 11-34 through 11-44
California Heat Pump	- Tables 11-45 through 11-55
Equipment Energy Consumption	
Double Bundle Condensor	- Tables 11-56 through 11-57
Mechanical Gas Heat Pump	- Tables 11-58 through 11-61
Electrical Gas Heat Pump	- Tables 11-62 through 11-66
Cooling Tower Operation for Above Equipments	- Tables 11-67 through 11-70
Equipment Energy Consumption Reciprocating Chiller with Gas Boiler and California Heat Pump	- Tables 11-71 through 11-80
Monthly Utility Costs	- Tables 11-81 through 11-84
General Investment Analysis	- Tables 11-85 through 11-110

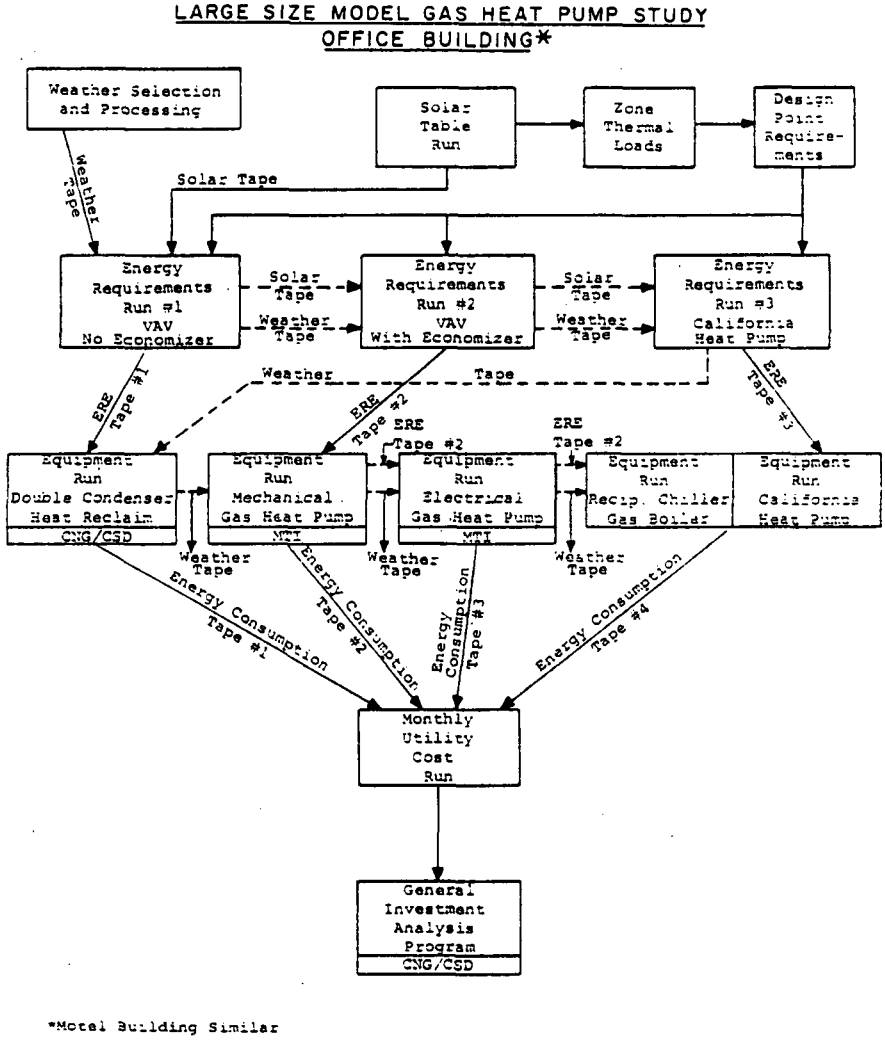


Fig. 11-2 Flow Diagram for Computer Programs

Extension Study

Solar Tables	- Tables 11-111 through 11-126
Zone Thermal Loads (Same as Base Study)	- Tables 11-127 through 11-130
Design Point Requirements (Same as Base Study)	- Tables 11-131 through 11-133

Energy Requirement Estimates

Variable Air Volume, No Economizer	- Tables 11-134 through 11-144
Variable Air Volume, With Economizer	- Tables 11-145 through 11-155
Equipment Energy Consumption - Double Bundle Condenser	- Tables 11-156 through 11-157
Cooling Tower Operation for Double Bundle Condenser	- Tables 11-158 through 11-162

Equipment Energy Consumption

Reciprocating Chiller & Gas Boiler	- Tables 11-163 through 11-169
Reciprocating Chiller & Electric Boiler	- Tables 11-170 through 11-177
Monthly Utility Costs	- Tables 11-178 through 11-185
General Investment Analysis	- Tables 11-186 through 11-202

11.4 CNG Typical Weather Year Selection Method (Table 11-203)

11.5 Average Residential/Small Business Commercial Costs (Table 11-204)

TABLE 11-1

ASHRAE BASED SOLAR TABLES FOR

SOLAR TABLE RUN FOR CLEVELAND

LATITUDE	= 41.3
LONGITUDE	= 81.8
TIME ZONE	= 5
ATMOS CLRNS	= 0.95
GRND REFLC	= 0.14
IN FLM FRAC	=0.095
DST KEY	= 0
TAPE KEY	= 0

LAGGING DATA

VERT PCT	= 42
VERT HRS	= 3
VERT TYP	= 0
HORIZ PCT	= 10
HORIZ HRS	= 6
HORIZ TYP	= 0

ALP VALUES	TAU VALUES
0.01154	-0.00890
0.77674	2.71240
-3.94700	-0.62060
8.57880	-7.07300
-8.38100	9.76070
3.01193	-3.89900

WALL AZIM	TILT
1.0	0
45.0	0
90.0	0
135.0	0
180.0	0
225.0	0
270.0	0
315.0	0

TABLE 11-2

** JAN SOLAR HEAT GAIN FACTORS FOR 41.3 DEGS LATITUDE ** (NO SHADING OR LAGGING EFFECTS)

	12M	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
ALT	0.	0.	0.	0.	0.0	0.0	0.0	0.0	3.0	12.1	19.8	25.4	28.3	28.2	25.0	19.2	11.4	2.1	0.0	0.0	0.	0.	0.	0.
AZIM	0.	0.	0.	0.	0.0	0.0	0.0	0.0	-59.9	-49.1	-36.8	-22.8	-7.3	8.7	24.1	37.9	50.1	60.8	0.0	0.0	0.	0.	0.	0.
DNI	0	0	0	0	0	0	0	0	24	189	244	266	275	274	265	241	180	8	0	0	0	0	0	0
1.0	0	0	0	0	0	0	0	0	1	7	11	14	15	15	13	11	7	0	0	0	0	0	0	0
45.0	0	0	0	0	0	0	0	0	4	11	12	14	15	15	13	11	7	0	0	0	0	0	0	0
90.0	0	0	0	0	0	0	0	0	20	133	130	82	26	15	13	11	7	0	0	0	0	0	0	0
135.0	0	0	0	0	0	0	0	0	22	177	221	217	186	137	74	21	7	0	0	0	0	0	0	0
180.0	0	0	0	0	0	0	0	0	11	114	177	216	235	234	214	172	107	3	0	0	0	0	0	0
225.0	0	0	0	0	0	0	0	0	1	8	24	80	142	189	219	219	169	7	0	0	0	0	0	0
270.0	0	0	0	0	0	0	0	0	1	7	11	14	16	29	87	133	129	6	0	0	0	0	0	0
315.0	0	0	0	0	0	0	0	0	1	7	11	14	15	15	13	12	12	2	0	0	0	0	0	0
HORIZ	0	0	0	0	0	0	0	0	1	29	69	101	117	116	98	65	26	0	0	0	0	0	0	0

** FEB SOLAR HEAT GAIN FACTORS FOR 41.3 DEGS LATITUDE ** (NO SHADING OR LAGGING EFFECTS)

	12M	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
ALT	0.	0.	0.	0.	0.0	0.0	0.0	0.0	9.6	19.4	27.8	34.1	37.5	37.3	33.7	27.1	18.6	8.7	0.0	0.0	0.	0.	0.	0.
AZIM	0.	0.	0.	0.	0.0	0.0	0.0	0.0	-66.3	-55.0	-41.7	-26.2	-8.5	10.1	27.7	43.0	56.0	67.3	0.0	0.0	0.	0.	0.	0.
DNI	0	0	0	0	0	0	0	0	154	237	269	283	289	288	282	267	233	141	0	0	0	0	0	0
1.0	0	0	0	0	0	0	0	0	6	11	15	17	18	18	17	14	11	5	0	0	0	0	0	0
45.0	0	0	0	0	0	0	0	0	47	29	16	17	18	18	17	14	11	5	0	0	0	0	0	0
90.0	0	0	0	0	0	0	0	0	134	177	153	95	30	19	17	14	11	5	0	0	0	0	0	0
135.0	0	0	0	0	0	0	0	0	137	215	233	218	181	126	59	17	11	5	0	0	0	0	0	0
180.0	0	0	0	0	0	0	0	0	53	121	172	207	224	223	204	168	116	46	0	0	0	0	0	0
225.0	0	0	0	0	0	0	0	0	6	11	18	65	131	185	221	233	211	124	0	0	0	0	0	0
270.0	0	0	0	0	0	0	0	0	6	11	15	17	19	44	101	157	177	124	0	0	0	0	0	0
315.0	0	0	0	0	0	0	0	0	6	11	15	17	18	18	17	16	31	45	0	0	0	0	0	0
HORIZ	0	0	0	0	0	0	0	0	19	66	113	146	162	162	144	109	61	15	0	0	0	0	0	0

TABLE 11-3

** MAR SOLAR HEAT GAIN FACTORS FOR 41.3 DEGS LATITUDE ** (NO SHADING OR LAGGING EFFECTS)

	12M	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
ALT	0.	0.	0.	0.	0.0	0.0	0.0	6.1	17.2	27.6	36.9	44.2	48.2	48.0	43.7	36.2	26.8	16.2	5.1	0.0	0.	0.	0.	0.
AZIM	0.	0.	0.	0.	0.0	0.0	0.0	-84.6	-74.2	-62.6	-48.6	-31.2	-10.3	12.3	32.9	50.0	63.7	75.2	85.5	0.0	0.	0.	0.	0.
DNI	0	0	0	0	0	0	0	83	211	255	276	286	290	290	285	274	253	204	62	0	0	0	0	0
1.0	0	0	0	0	0	0	0	4	10	15	18	21	22	22	20	18	15	10	3	0	0	0	0	0
45.0	0	0	0	0	0	0	0	50	92	59	22	21	22	22	20	18	15	10	2	0	0	0	0	0
90.0	0	0	0	0	0	0	0	79	191	199	164	102	35	22	20	18	15	10	2	0	0	0	0	0
135.0	0	0	0	0	0	0	0	61	173	214	220	200	160	101	40	19	15	10	2	0	0	0	0	0
180.0	0	0	0	0	0	0	0	6	45	98	144	176	192	191	174	141	93	41	4	0	0	0	0	0
225.0	0	0	0	0	0	0	0	3	10	15	20	44	107	164	203	221	212	167	45	0	0	0	0	0
270.0	0	0	0	0	0	0	0	3	10	15	18	21	23	39	108	169	201	187	60	0	0	0	0	0
315.0	0	0	0	0	0	0	0	3	10	15	18	21	22	22	21	24	63	93	38	0	0	0	0	0
HORIZ	0	0	0	0	0	0	0	8	52	109	156	188	204	203	186	152	104	47	5	0	0	0	0	0

** APR SOLAR HEAT GAIN FACTORS FOR 41.3 DEGS LATITUDE ** (NO SHADING OR LAGGING EFFECTS)

	12M	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
ALT	0.	0.	0.	0.	0.0	0.0	2.6	13.7	25.0	36.0	46.2	54.6	59.7	59.4	54.0	45.3	35.0	24.0	12.7	1.6	0.	0.	0.	0.
AZIM	0.	0.	0.	0.	0.0	0.0	-103.2	-93.5	-83.4	-72.1	-58.0	-39.0	-13.3	15.9	41.0	59.4	73.2	84.4	94.4	104.1	0.	0.	0.	0.
DNI	0	0	0	0	0	0	6	160	223	252	266	274	278	277	274	266	250	220	151	1	0	0	0	0
1.0	0	0	0	0	0	0	1	13	16	20	23	25	26	26	25	23	19	16	13	0	0	0	0	0
45.0	0	0	0	0	0	0	5	117	128	92	43	27	26	26	25	23	19	15	9	0	0	0	0	0
90.0	0	0	0	0	0	0	6	157	207	201	164	103	39	27	25	23	19	15	9	0	0	0	0	0
135.0	0	0	0	0	0	0	3	103	162	188	188	166	125	70	29	23	19	15	9	0	0	0	0	0
180.0	0	0	0	0	0	0	0	10	24	60	99	129	144	143	127	96	56	22	10	0	0	0	0	0
225.0	0	0	0	0	0	0	0	9	15	20	24	31	75	130	169	189	186	158	96	0	0	0	0	0
270.0	0	0	0	0	0	0	0	9	15	20	23	25	27	43	109	168	203	205	149	1	0	0	0	0
315.0	0	0	0	0	0	0	0	9	15	20	23	25	26	26	27	47	97	129	112	1	0	0	0	0
HORIZ	0	0	0	0	0	0	1	34	91	145	188	218	234	233	216	184	140	85	30	0	0	0	0	0

TABLE 11-4

** MAY SOLAR HEAT GAIN FACTORS FOR 41.3 DEGS LATITUDE ** (NO SHADING OR LAGGING EFFECTS)

	12M	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
ALT	0.	0.	0.	0.	0.0	0.0	8.2	19.0	30.2	41.4	52.2	61.7	67.9	67.6	61.0	51.3	40.5	29.2	18.0	7.2	0.	0.	0.	0.
AZIM	0.	0.	0.	0.	0.0	0.0	-109.5	-100.3	-90.8	-80.3	-68.9	-47.6	-17.3	20.5	49.7	68.3	81.3	91.7	101.1	110.3	0.	0.	0.	0.
DNI	0	0	0	0	0	0	84	182	225	247	259	266	269	269	266	259	246	223	177	70	0	0	0	0
1.0	0	0	0	0	0	0	26	30	22	24	26	28	29	29	28	26	24	22	31	23	0	0	0	0
45.0	0	0	0	0	0	0	78	148	148	114	63	32	30	29	28	26	23	19	13	4	0	0	0	0
90.0	0	0	0	0	0	0	81	178	207	196	159	131	42	30	28	26	23	19	13	4	0	0	0	0
135.0	0	0	0	0	0	0	35	102	144	163	160	138	98	51	30	26	23	19	13	4	0	0	0	0
180.0	0	0	0	0	0	0	5	14	21	37	66	92	106	105	90	64	35	21	14	4	0	0	0	0
225.0	0	0	0	0	0	0	5	14	19	23	26	31	54	102	141	161	162	141	97	29	0	0	0	0
270.0	0	0	0	0	0	0	5	14	19	23	26	28	31	46	107	163	198	206	173	67	0	0	0	0
315.0	0	0	0	0	0	0	5	14	19	23	26	28	29	30	32	68	118	150	146	65	0	0	0	0
HORIZ	0	0	0	0	0	0	13	59	115	165	206	234	249	248	232	203	161	111	54	10	0	0	0	0

** JUN SOLAR HEAT GAIN FACTORS FOR 41.3 DEGS LATITUDE ** (NO SHADING OR LAGGING EFFECTS)

	12M	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
ALT	0.	0.	0.	0.	0.0	0.4	10.4	21.1	32.3	43.5	54.5	64.5	71.2	70.9	63.7	53.6	42.5	31.3	20.2	9.5	0.	0.	0.	0.
AZIM	0.	0.	0.	0.	0.0	-121.6	-112.2	-103.2	-94.1	-84.0	-71.3	-52.3	-19.8	23.4	54.4	72.6	85.0	94.9	104.0	113.0	0.	0.	0.	0.
DNI	0	0	0	0	0	0	135	186	223	243	255	261	264	264	261	254	242	221	181	95	0	0	0	0
1.0	0	0	0	0	0	0	39	40	26	27	28	29	30	30	29	28	26	27	41	37	0	0	0	0
45.0	0	0	0	0	0	0	101	157	154	122	72	35	32	30	29	27	24	20	15	7	0	0	0	0
90.0	0	0	0	0	0	0	102	180	203	192	156	99	43	32	29	27	24	20	15	7	0	0	0	0
135.0	0	0	0	0	0	0	41	97	134	151	147	125	86	45	32	27	24	20	15	7	0	0	0	0
180.0	0	0	0	0	0	0	8	15	23	32	54	77	90	89	75	52	31	22	15	7	0	0	0	0
225.0	0	0	0	0	0	0	8	15	21	25	28	32	48	90	128	149	150	131	92	35	0	0	0	0
270.0	0	0	0	0	0	0	8	15	21	25	28	29	32	47	105	160	194	203	176	91	0	0	0	0
315.0	0	0	0	0	0	0	8	15	21	25	28	29	30	32	37	77	126	156	155	91	0	0	0	0
HORIZ	0	0	0	0	0	0	21	69	124	172	211	238	252	251	236	208	168	119	64	18	0	0	0	0

TABLE 11-5

** JUL SOLAR HEAT GAIN FACTORS FOR 41.3 DEGS LATITUDE ** (NO SHADING OR LAGGING EFFECTS)

	12M	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
ALT	0.	0.	0.	0.	0.0	0.0	4.6	19.4	30.6	41.8	52.7	62.2	68.5	68.1	61.5	51.7	40.8	29.6	18.4	7.6	0.	0.	0.	0.
AZIM	0.	0.	0.	0.	0.0	0.0	-110.0	-100.8	-91.4	-80.9	-67.7	-48.4	-17.7	20.9	50.4	69.0	81.9	92.3	101.6	110.8	0.	0.	0.	0.
DNI	0	0	0	0	0	0	81	175	218	240	252	259	262	261	258	251	238	215	170	69	0	0	0	0
1.0	0	0	0	0	0	0	27	31	23	26	27	29	30	30	29	27	25	23	32	24	0	0	0	0
45.0	0	0	0	0	0	0	77	146	147	115	65	33	31	30	29	27	24	20	14	5	0	0	0	0
90.0	0	0	0	0	0	0	80	174	203	193	157	100	43	32	29	27	24	20	14	5	0	0	0	0
135.0	0	0	0	0	0	0	35	99	140	159	157	135	96	51	32	27	24	20	14	5	0	0	0	0
180.0	0	0	0	0	0	0	6	15	22	37	64	89	103	102	87	62	35	22	14	5	0	0	0	0
225.0	0	0	0	0	0	0	6	14	20	24	27	32	54	100	138	158	158	137	94	28	0	0	0	0
270.0	0	0	0	0	0	0	6	14	20	24	27	29	32	47	106	161	195	202	169	67	0	0	0	0
315.0	0	0	0	0	0	0	6	14	20	24	27	29	30	31	34	70	118	148	143	66	0	0	0	0
HORIZ	0	0	0	0	0	0	14	60	116	164	204	232	246	245	230	201	160	111	56	11	0	0	0	0

** AUG SOLAR HEAT GAIN FACTORS FOR 41.3 DEGS LATITUDE ** (NO SHADING OR LAGGING EFFECTS)

	12M	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
ALT	0.	0.	0.	0.	0.0	0.0	3.1	14.2	25.4	36.4	46.7	55.3	60.4	60.1	54.6	45.8	35.5	24.4	13.2	2.1	0.	0.	0.	0.
AZIM	0.	0.	0.	0.	0.0	0.0	-103.7	-94.0	-84.0	-72.7	-58.7	-39.6	-13.6	16.2	41.6	60.1	73.8	85.0	94.9	104.6	0.	0.	0.	0.
DNI	0	0	0	0	0	0	8	147	209	238	253	261	265	264	261	252	236	205	138	1	0	0	0	0
1.0	0	0	0	0	0	0	2	14	18	21	25	27	28	28	27	24	21	18	14	0	0	0	0	0
45.0	0	0	0	0	0	0	7	112	125	93	46	29	28	28	27	24	21	16	10	0	0	0	0	0
90.0	0	0	0	0	0	0	8	148	199	195	161	102	41	29	27	24	21	16	10	0	0	0	0	0
135.0	0	0	0	0	0	0	4	97	155	161	182	162	122	69	31	25	21	16	10	0	0	0	0	0
180.0	0	0	0	0	0	0	0	11	25	58	96	125	140	139	123	93	54	23	11	0	0	0	0	0
225.0	0	0	0	0	0	0	0	10	17	21	26	32	74	126	165	183	180	151	90	1	0	0	0	0
270.0	0	0	0	0	0	0	0	10	17	21	25	27	29	45	108	165	197	197	140	1	0	0	0	0
315.0	0	0	0	0	0	0	0	10	17	21	25	27	28	28	29	50	97	126	107	1	0	0	0	0
HORIZ	0	0	0	0	0	0	1	36	91	144	185	215	230	230	213	182	139	86	31	0	0	0	0	0

TABLE 11-6

** SEP SOLAR HEAT GAIN FACTORS FOR 41.3 DEGS LATITUDE ** (NO SHADING OR LAGGING EFFECTS)

	12M	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
ALT	0.	0.	0.	0.	0.0	0.0	0.0	6.1	17.2	27.6	36.9	43.2	44.2	48.0	43.7	36.2	26.8	16.2	5.1	0.0	0.	0.	0.	0.
AZIM	0.	0.	0.	0.	0.0	0.0	0.0	-84.6	-74.2	-62.6	-48.6	-31.2	-10.3	12.3	32.9	50.0	63.7	75.2	85.5	0.0	0.	0.	0.	0.
DNI	0	0	0	0	0	0	0	66	190	237	258	269	273	273	268	257	234	184	48	0	0	0	0	0
1.0	0	0	0	0	0	0	0	4	11	16	20	22	23	23	22	19	16	11	3	0	0	0	0	0
45.0	0	0	0	0	0	0	0	41	87	58	24	23	23	23	22	19	16	11	2	0	0	0	0	0
90.0	0	0	0	0	0	0	0	65	177	190	159	100	36	24	22	19	16	11	2	0	0	0	0	0
135.0	0	0	0	0	0	0	0	50	160	204	212	194	156	99	41	21	16	11	2	0	0	0	0	0
180.0	0	0	0	0	0	0	0	5	43	95	149	171	187	186	169	136	90	39	4	0	0	0	0	0
225.0	0	0	0	0	0	0	0	3	11	16	21	45	105	160	197	213	202	154	36	0	0	0	0	0
270.0	0	0	0	0	0	0	0	3	11	16	20	22	24	41	106	163	191	173	47	0	0	0	0	0
315.0	0	0	0	0	0	0	0	3	11	16	20	22	23	23	23	26	62	87	30	0	0	0	0	0
HORIZ	0	0	0	0	0	0	0	7	51	105	151	182	198	197	183	147	101	46	5	0	0	0	0	0

** OCT SOLAR HEAT GAIN FACTORS FOR 41.3 DEGS LATITUDE ** (NO SHADING OR LAGGING EFFECTS)

	12M	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
ALT	0.	0.	0.	0.	0.0	0.0	0.0	0.0	9.8	19.6	28.1	34.4	37.8	37.6	33.9	27.4	18.8	8.9	0.0	0.0	0.	0.	0.	0.
AZIM	0.	0.	0.	0.	0.0	0.0	0.0	0.0	-66.5	-55.2	-41.9	-26.3	-8.5	10.2	27.8	43.2	56.2	67.5	0.0	0.0	0.	0.	0.	0.
DNI	0	0	0	0	0	0	0	0	143	223	256	271	277	276	270	254	219	127	0	0	0	0	0	0
1.0	0	0	0	0	0	0	0	0	6	12	15	18	19	19	18	15	11	5	0	0	0	0	0	0
45.0	0	0	0	0	0	0	0	0	45	29	17	18	19	19	18	15	11	5	0	0	0	0	0	0
90.0	0	0	0	0	0	0	0	0	124	170	149	93	31	20	18	15	11	5	0	0	0	0	0	0
135.0	0	0	0	0	0	0	0	0	126	205	225	212	176	122	58	18	12	5	0	0	0	0	0	0
180.0	0	0	0	0	0	0	0	0	49	116	166	200	217	216	198	162	111	43	0	0	0	0	0	0
225.0	0	0	0	0	0	0	0	0	6	12	19	64	128	180	214	225	201	114	0	0	0	0	0	0
270.0	0	0	0	0	0	0	0	0	6	12	15	18	20	35	99	152	169	114	0	0	0	0	0	0
315.0	0	0	0	0	0	0	0	0	6	12	15	18	19	19	18	17	32	43	0	0	0	0	0	0
HORIZ	0	0	0	0	0	0	0	0	19	65	111	144	160	159	142	108	61	16	0	0	0	0	0	0

TABLE 11-7

** NOV SOLAR HEAT GAIN FACTORS FOR 41.3 DEGS LATITUDE ** (NO SHADING OR LAGGING EFFECTS)

	12M	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
ALT	0.	0.	0.	0.	0.0	0.0	0.0	0.0	3.1	12.3	20.0	25.6	24.5	28.4	25.2	19.4	11.5	0.0	0.0	0.0	0.	0.	0.	0.
AZIM	0.	0.	0.	0.	0.0	0.0	0.0	0.0	-60.0	-49.2	-36.9	-22.8	-7.3	8.7	24.1	38.0	50.2	0.0	0.0	0.0	0.	0.	0.	0.
DNI	0	0.	0	0	0	0	0	0	24	183	238	260	269	269	259	235	174	0	0	0	0	0	0	0
1.0	0	0	0	0	0	0	0	0	1	8	12	14	15	15	14	11	7	0	0	0	0	0	0	0
45.0	0	0	0	0	0	0	0	0	5	11	12	14	15	15	14	11	7	0	0	0	0	0	0	0
90.0	0	0	0	0	0	0	0	0	20	130	128	81	26	16	14	11	7	0	0	0	0	0	0	0
135.0	0	0	0	0	0	0	0	0	22	172	217	214	183	135	73	21	8	0	0	0	0	0	0	0
180.0	0	0	0	0	0	0	0	0	11	111	173	213	232	231	210	169	104	0	0	0	0	0	0	0
225.0	0	0	0	0	0	0	0	0	1	8	24	79	139	187	215	215	165	0	0	0	0	0	0	0
270.0	0	0	0	0	0	0	0	0	1	8	12	14	16	30	87	131	126	0	0	0	0	0	0	0
315.0	0	0	0	0	0	0	0	0	1	8	12	14	15	15	14	12	12	0	0	0	0	0	0	0
HORIZ	0	0	0	0	0	0	0	0	2	30	69	101	117	116	98	66	26	0	0	0	0	0	0	0

** DEC SOLAR HEAT GAIN FACTORS FOR 41.3 DEGS LATITUDE ** (NO SHADING OR LAGGING EFFECTS)

	12M	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
ALT	0.	0.	0.	0.	0.0	0.0	0.0	0.0	0.5	9.4	16.8	22.1	24.9	24.8	21.7	16.2	8.6	0.0	0.0	0.0	0.	0.	0.	0.
AZIM	0.	0.	0.	0.	0.0	0.0	0.0	0.0	-57.5	-47.0	-35.1	-21.6	-6.9	8.3	22.9	36.2	48.0	0.0	0.0	0.0	0.	0.	0.	0.
DNI	0	0	0	0	0	0	0	0	0	155	227	255	265	265	253	223	144	0	0	0	0	0	0	0
1.0	0	0	0	0	0	0	0	0	0	6	10	12	13	13	12	9	5	0	0	0	0	0	0	0
45.0	0	0	0	0	0	0	0	0	0	7	10	12	13	13	12	9	5	0	0	0	0	0	0	0
90.0	0	0	0	0	0	0	0	0	0	106	117	75	23	14	12	9	5	0	0	0	0	0	0	0
135.0	0	0	0	0	0	0	0	0	0	147	207	211	183	137	77	23	6	0	0	0	0	0	0	0
180.0	0	0	0	0	0	0	0	0	0	99	171	213	233	232	211	166	90	0	0	0	0	0	0	0
225.0	0	0	0	0	0	0	0	0	0	6	27	83	141	186	212	205	136	0	0	0	0	0	0	0
270.0	0	0	0	0	0	0	0	0	0	6	10	12	14	27	80	119	100	0	0	0	0	0	0	0
315.0	0	0	0	0	0	0	0	0	0	6	10	12	13	13	12	10	7	0	0	0	0	0	0	0
HORIZ	0	0	0	0	0	0	0	0	0	18	52	82	98	97	80	49	15	0	0	0	0	0	0	0

TABLE 11-8

70 CARD OUTPUT TABLE (PRINT IS 2414, FILE IS 2414) FOR 41.5 DEG LAT (INCLUDING SHAD AND LAGGING, WHERE APPROPRIATE)

	12A	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
JAN&NOV, DIR= 1.0 DEG	0	0	0	0	0	0	0	0	0	3	6	10	12	14	14	13	10	6	3	1	0	0	0	0
JAN&NOV, DIR= 45.0 DEG	0	0	0	0	0	0	0	0	2	5	8	11	13	14	14	13	10	6	3	1	0	0	0	0
JAN&NOV, DIR= 90.0 DEG	0	0	0	0	0	0	0	0	8	60	84	89	78	52	29	15	10	6	3	1	0	0	0	0
JAN&NOV, DIR= 135.0 DEG	0	0	0	0	0	0	0	0	9	79	131	172	197	178	135	86	48	20	5	1	0	0	0	0
JAN&NOV, DIR= 180.0 DEG	0	0	0	0	0	0	0	0	5	50	99	149	197	220	222	204	165	97	55	21	1	0	0	0
JAN&NOV, DIR= 225.0 DEG	0	0	0	0	0	0	0	0	0	4	12	40	81	127	171	198	192	120	76	34	1	0	0	0
JAN&NOV, DIR= 270.0 DEG	0	0	0	0	0	0	0	0	0	3	6	10	13	20	48	81	102	70	52	26	1	0	0	0
JAN&NOV, DIR= 315.0 DEG	0	0	0	0	0	0	0	0	0	3	6	10	12	14	14	13	13	8	5	3	0	0	0	0
JAN&NOV, DIR= HORIZONTAL	0	0	0	0	0	0	0	0	0	3	11	25	42	59	75	86	87	78	63	46	28	14	4	0
JAN&NOV, DIR= DIFFUSE ONLY	0	0	0	0	0	0	0	0	0	3	6	10	12	14	14	13	10	6	3	1	0	0	0	0
FEB&OCT, DIR= 1.0 DEG	0	0	0	0	0	0	0	0	3	6	10	13	16	17	17	16	14	10	6	3	1	0	0	0
FEB&OCT, DIR= 45.0 DEG	0	0	0	0	0	0	0	0	20	21	21	25	20	17	17	16	14	10	6	3	1	0	0	0
FEB&OCT, DIR= 90.0 DEG	0	0	0	0	0	0	0	0	56	100	124	130	95	62	35	19	14	10	6	3	1	0	0	0
FEB&OCT, DIR= 135.0 DEG	0	0	0	0	0	0	0	0	58	117	166	205	205	175	126	78	44	19	6	3	1	0	0	0
FEB&OCT, DIR= 180.0 DEG	0	0	0	0	0	0	0	0	22	61	106	154	191	210	212	196	164	114	64	31	9	0	0	0
FEB&OCT, DIR= 225.0 DEG	0	0	0	0	0	0	0	0	3	6	11	34	73	119	166	202	212	181	110	65	24	0	0	0
FEB&OCT, DIR= 270.0 DEG	0	0	0	0	0	0	0	0	3	6	10	13	16	24	56	96	131	136	89	58	24	0	0	0
FEB&OCT, DIR= 315.0 DEG	0	0	0	0	0	0	0	0	3	6	10	13	16	17	17	17	23	31	18	15	9	0	0	0
FEB&OCT, DIR= HORIZONTAL	0	0	0	0	0	0	0	0	2	9	24	44	68	92	115	130	131	119	98	74	49	28	11	2
FEB&OCT, DIR= DIFFUSE ONLY	0	0	0	0	0	0	0	0	3	6	10	13	16	17	17	16	14	10	6	3	1	0	0	0
MAR&SEP, DIR= 1.0 DEG	0	0	0	0	0	0	0	2	5	9	13	17	20	21	21	20	18	14	10	5	3	1	0	0
MAR&SEP, DIR= 45.0 DEG	0	0	0	0	0	0	0	21	48	52	48	42	29	22	21	20	18	14	9	5	2	0	0	0
MAR&SEP, DIR= 90.0 DEG	0	0	0	0	0	0	0	33	95	136	160	150	105	67	39	22	18	14	9	5	2	0	0	0
MAR&SEP, DIR= 135.0 DEG	0	0	0	0	0	0	0	26	84	135	179	201	190	155	106	66	37	19	9	5	2	0	0	0
MAR&SEP, DIR= 180.0 DEG	0	0	0	0	0	0	0	3	20	51	89	129	161	179	181	167	137	96	55	27	9	1	0	0
MAR&SEP, DIR= 225.0 DEG	0	0	0	0	0	0	0	1	5	9	14	27	60	102	146	184	203	193	135	82	41	9	0	0
MAR&SEP, DIR= 270.0 DEG	0	0	0	0	0	0	0	1	5	9	13	17	20	28	61	104	146	171	133	87	48	12	0	0
MAR&SEP, DIR= 315.0 DEG	0	0	0	0	0	0	0	1	5	9	13	17	20	21	21	23	39	60	51	38	25	7	0	0
MAR&SEP, DIR= HORIZONTAL	1	0	0	0	0	0	0	1	6	20	41	68	97	128	155	172	174	160	135	105	74	46	23	8
MAR&SEP, DIR= DIFFUSE ONLY	0	0	0	0	0	0	0	1	5	9	13	17	20	21	21	20	18	14	9	5	2	0	0	0
APR&AUG, DIR= 1.0 DEG	0	0	0	0	0	0	0	6	9	14	19	22	24	25	25	25	22	20	17	9	6	3	0	0
APR&AUG, DIR= 45.0 DEG	0	0	0	0	0	0	2	50	77	87	83	62	42	29	26	25	22	19	15	8	5	2	0	0
APR&AUG, DIR= 90.0 DEG	0	0	0	0	0	0	3	67	118	156	178	154	107	70	43	27	22	19	15	8	5	2	0	0
APR&AUG, DIR= 135.0 DEG	0	0	0	0	0	0	1	44	89	131	167	174	157	122	82	53	32	20	15	8	5	2	0	0
APR&AUG, DIR= 180.0 DEG	0	0	0	0	0	0	0	4	12	32	60	90	116	132	134	120	94	63	38	17	6	2	0	0
APR&AUG, DIR= 225.0 DEG	0	0	0	0	0	0	0	4	8	13	19	24	46	80	117	152	172	172	143	85	49	19	0	0
APR&AUG, DIR= 270.0 DEG	0	0	0	0	0	0	0	4	8	13	18	22	24	33	64	105	147	179	174	108	69	29	0	0
APR&AUG, DIR= 315.0 DEG	0	0	0	0	0	0	0	4	8	13	18	22	24	25	26	35	60	87	100	66	47	22	0	0
APR&AUG, DIR= HORIZONTAL	4	0	0	0	0	0	0	4	14	33	59	91	125	160	188	203	205	192	167	133	98	66	38	17
APR&AUG, DIR= DIFFUSE ONLY	0	0	0	0	0	0	0	4	8	13	18	22	24	25	25	25	22	19	15	8	5	2	0	0

TABLE 11-9

[illegible] (INCLUDING SHADE AND FANNING, WHERE APPROPRIATE)

	12M	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
MAY&JUL, DIR= 1.0 DEG	0	0	0	0	0	0	11	18	20	25	26	26	27	28	28	28	26	24	27	25	15	10	4	0
MAY&JUL, DIR= 45.0 DEG	0	0	0	0	0	0	33	77	106	120	106	76	53	36	29	28	26	23	19	12	7	3	1	0
MAY&JUL, DIR= 90.0 DEG	0	0	0	0	0	0	34	90	137	172	179	151	106	71	45	30	26	23	19	12	7	3	1	0
MAY&JUL, DIR= 135.0 DEG	0	0	0	0	0	0	15	50	87	123	146	148	130	98	68	46	30	23	19	12	7	3	1	0
MAY&JUL, DIR= 180.0 DEG	0	0	0	0	0	0	2	7	12	23	42	63	82	95	96	85	65	45	29	15	8	3	1	0
MAY&JUL, DIR= 225.0 DEG	0	0	0	0	0	0	2	7	12	17	22	26	38	64	95	125	146	149	130	90	52	24	6	0
MAY&JUL, DIR= 270.0 DEG	0	0	0	0	0	0	2	7	12	17	22	25	28	36	65	104	144	177	182	140	86	46	13	0
MAY&JUL, DIR= 315.0 DEG	0	0	0	0	0	0	2	7	12	17	22	25	27	29	33	46	75	105	126	107	70	41	13	0
MAY&JUL, DIR= HORIZONTAL	10	1	0	0	0	0	1	8	22	45	73	107	144	179	206	220	222	210	186	152	116	81	50	26
MAY&JUL, DIR= DIFFUSE ONLY	0	0	0	0	0	0	2	7	12	17	22	25	27	28	28	28	26	23	19	12	7	3	1	0
JUN , DIR= 1.0 DEG	0	0	0	0	0	0	16	24	26	32	30	28	29	29	29	29	28	27	33	34	20	15	7	0
JUN , DIR= 45.0 DEG	0	0	0	0	0	0	42	85	115	131	114	82	58	39	31	29	27	24	20	14	8	4	1	0
JUN , DIR= 90.0 DEG	0	0	0	0	0	0	43	95	140	174	177	148	104	71	46	31	27	24	20	14	8	4	1	0
JUN , DIR= 135.0 DEG	0	0	0	0	0	0	17	49	83	116	136	136	118	88	63	43	30	24	20	14	8	4	1	0
JUN , DIR= 180.0 DEG	0	0	0	0	0	0	3	8	14	22	36	53	69	80	81	71	55	40	27	16	9	4	1	0
JUN , DIR= 225.0 DEG	0	0	0	0	0	0	3	8	13	19	24	28	37	59	87	114	134	138	122	87	50	25	7	0
JUN , DIR= 270.0 DEG	0	0	0	0	0	0	3	8	13	19	24	26	29	37	65	103	142	174	182	149	91	52	18	0
JUN , DIR= 315.0 DEG	0	0	0	0	0	0	3	8	13	19	24	26	28	30	33	51	81	112	135	123	78	48	18	0
JUN , DIR= HORIZONTAL	12	3	0	0	0	0	2	10	26	49	79	113	150	185	211	225	226	215	191	159	122	87	55	30
JUN , DIR= DIFFUSE ONLY	0	0	0	0	0	0	3	8	13	19	24	26	28	29	29	29	27	24	20	14	8	4	1	0
DEC , DIR= 1.0 DEG	0	0	0	0	0	0	0	0	0	3	5	8	11	12	12	11	9	5	3	1	0	0	0	0
DEC , DIR= 45.0 DEG	0	0	0	0	0	0	0	0	0	3	6	8	11	12	12	11	9	5	3	1	0	0	0	0
DEC , DIR= 90.0 DEG	0	0	0	0	0	0	0	0	0	45	70	75	67	47	27	13	9	5	3	1	0	0	0	0
DEC , DIR= 135.0 DEG	0	0	0	0	0	0	0	0	0	62	115	157	186	174	135	86	48	23	6	1	0	0	0	0
DEC , DIR= 180.0 DEG	0	0	0	0	0	0	0	0	0	42	91	142	191	217	220	200	156	90	49	17	0	0	0	0
DEC , DIR= 225.0 DEG	0	0	0	0	0	0	0	0	0	3	12	41	82	127	168	190	174	107	66	26	0	0	0	0
DEC , DIR= 270.0 DEG	0	0	0	0	0	0	0	0	0	3	5	8	11	18	44	73	86	58	42	19	0	0	0	0
DEC , DIR= 315.0 DEG	0	0	0	0	0	0	0	0	0	3	5	8	11	12	12	12	10	6	3	1	0	0	0	0
DEC , DIR= HORIZONTAL	0	0	0	0	0	0	0	0	0	2	8	19	33	47	63	69	70	63	51	36	22	10	2	0
DEC , DIR= DIFFUSE ONLY	0	0	0	0	0	0	0	0	0	3	5	8	11	12	12	11	9	5	3	1	0	0	0	0

TABLE 11-10

0	0	0	0	0	0	16	24	26	32	30	28	29	29	29	29	28	27	33	34	20	15	7	0V41.3,11
0	0	0	0	0	0	42	85	115	131	114	82	58	39	31	29	27	24	20	14	8	4	1	0V41.3,12
0	0	0	0	0	0	43	95	143	174	177	148	104	71	46	31	27	24	20	14	8	4	1	0V41.3,13
0	0	0	0	0	0	17	49	83	116	136	136	118	88	63	43	30	24	20	14	8	4	1	0V41.3,14
0	0	0	0	0	0	3	8	14	22	36	53	69	80	81	71	55	40	27	16	9	4	1	0V41.3,15
0	0	0	0	0	0	3	8	13	19	24	28	37	59	87	114	134	138	122	87	53	25	7	0V41.3,16
0	0	0	0	0	0	3	8	13	19	24	26	29	37	65	103	142	174	192	149	91	52	18	0V41.3,17
0	0	0	0	0	0	3	8	13	19	24	26	28	30	33	51	81	112	135	123	78	48	18	0V41.3,18
12	3	0	0	0	0	2	13	26	49	79	113	150	185	211	225	226	215	191	159	122	87	55	30V41.3,19
0	0	0	0	0	0	11	18	20	25	26	26	27	28	28	28	26	24	27	25	15	10	4	0V41.3,21
0	0	0	0	0	0	33	77	106	120	106	76	53	36	29	28	26	23	19	12	7	3	1	0V41.3,22
0	0	0	0	0	0	34	90	137	172	179	151	106	71	45	30	26	23	19	12	7	3	1	0V41.3,23
0	0	0	0	0	0	15	53	87	123	146	148	130	98	68	46	30	23	19	12	7	3	1	0V41.3,24
0	0	0	0	0	0	2	7	12	23	42	63	82	95	96	85	65	45	29	15	8	3	1	0V41.3,25
0	0	0	0	0	0	2	7	12	17	22	26	33	64	95	125	146	159	150	93	52	24	6	0V41.3,26
0	0	0	0	0	0	2	7	12	17	22	25	23	36	65	104	144	177	182	140	86	46	13	0V41.3,27
0	0	0	0	0	0	2	7	12	17	22	25	27	29	30	46	75	105	126	107	70	41	13	0V41.3,28
10	1	0	0	0	0	1	8	22	45	73	107	144	179	206	220	222	210	186	152	116	81	50	26V41.3,29
0	0	0	0	0	0	0	8	9	14	19	22	24	25	25	25	22	20	17	9	6	3	0	0V41.3,31
0	0	0	0	0	0	2	53	77	87	83	62	42	29	26	25	22	19	15	8	5	2	0	0V41.3,32
0	0	0	0	0	0	3	67	118	156	178	154	107	70	43	27	22	19	15	8	5	2	0	0V41.3,33
0	0	0	0	0	0	1	44	89	131	167	174	157	122	82	53	32	29	15	8	5	2	0	0V41.3,34
0	0	0	0	0	0	0	4	12	32	60	90	116	132	134	120	94	63	38	17	6	2	0	0V41.3,35
0	0	0	0	0	0	0	4	8	13	19	24	46	80	117	152	172	172	143	85	49	19	0	0V41.3,36
0	0	0	0	0	0	0	4	8	13	18	22	24	33	64	105	147	179	174	108	69	29	0	0V41.3,37
0	0	0	0	0	0	0	4	8	13	18	22	24	25	26	35	60	87	100	66	47	22	0	0V41.3,38
4	0	0	0	0	0	0	4	14	33	59	91	125	160	184	223	235	192	167	133	93	66	38	17V41.3,39
0	0	0	0	0	0	0	2	5	9	13	17	20	21	21	20	18	14	10	5	3	1	0	0V41.3,41
0	0	0	0	0	0	0	21	48	52	48	42	29	22	21	20	18	14	9	5	2	0	0	0V41.3,42
0	0	0	0	0	0	0	33	95	136	160	150	105	67	39	2.	18	14	9	5	2	0	0	0V41.3,43
0	0	0	0	0	0	0	26	84	135	179	201	190	155	106	66	37	19	9	5	2	0	0	0V41.3,44
0	0	0	0	0	0	0	3	20	51	89	129	161	179	181	167	137	96	55	27	9	1	0	0V41.3,45
0	0	0	0	0	0	0	1	5	9	14	27	60	102	146	184	203	193	135	82	41	9	0	0V41.3,46
0	0	0	0	0	0	0	1	5	9	13	17	20	28	61	104	146	171	133	67	48	12	0	0V41.3,47
0	0	0	0	0	0	0	1	5	9	13	17	20	21	21	23	39	63	51	38	25	7	0	0V41.3,48
1	0	0	0	0	0	0	1	6	20	41	63	97	128	155	172	174	160	135	105	74	46	23	8V41.3,49
0	0	0	0	0	0	0	0	3	6	10	13	16	17	17	16	14	10	6	3	1	0	0	0V41.3,51
0	0	0	0	0	0	0	0	20	21	21	25	20	17	17	16	14	10	6	3	1	0	0	0V41.3,52
0	0	0	0	0	0	0	0	56	100	124	130	95	62	35	19	14	10	6	3	1	0	0	0V41.3,53
0	0	0	0	0	0	0	0	58	117	166	205	205	175	126	78	44	19	6	3	1	0	0	0V41.3,54
0	0	0	0	0	0	0	0	22	61	106	154	191	210	212	196	164	114	64	31	9	0	0	0V41.3,55
0	0	0	0	0	0	0	0	3	6	11	34	73	119	166	202	221	218	110	65	24	0	0	0V41.3,56
0	0	0	0	0	0	0	0	3	6	10	13	16	24	56	96	131	136	89	58	24	0	0	0V41.3,57
0	0	0	0	0	0	0	0	3	6	10	13	16	17	17	17	23	31	18	15	9	0	0	0V41.3,58
0	0	0	0	0	0	0	0	2	9	24	44	68	92	115	130	131	119	93	74	47	28	11	2V41.3,59
0	0	0	0	0	0	0	0	3	6	10	12	14	14	13	10	6	3	1	0	0	0	0	0V41.3,61
0	0	0	0	0	0	0	0	2	5	8	11	13	14	14	13	10	6	3	1	0	0	0	0V41.3,62
0	0	0	0	0	0	0	0	8	60	84	89	78	52	29	15	10	6	3	1	0	0	0	0V41.3,63
0	0	0	0	0	0	0	0	9	79	131	172	197	178	135	86	48	20	5	1	0	0	0	0V41.3,64
0	0	0	0	0	0	0	0	5	50	99	149	197	220	222	204	165	97	55	21	1	0	0	0V41.3,65
0	0	0	0	0	0	0	0	0	4	12	40	81	127	171	198	192	129	76	34	1	0	0	0V41.3,66
0	0	0	0	0	0	0	0	0	3	6	10	13	20	48	81	102	70	52	26	1	0	0	0V41.3,67
0	0	0	0	0	0	0	0	0	3	6	10	12	14	14	13	13	8	5	3	0	0	0	0V41.3,68
0	0	0	0	0	0	0	0	0	3	11	25	42	59	75	86	87	78	63	46	28	14	4	0V41.3,69
0	0	0	0	0	0	0	0	0	3	5	8	11	12	12	11	9	5	3	1	0	0	0	0V41.3,71
0	0	0	0	0	0	0	0	0	3	6	8	11	12	12	11	9	5	3	1	0	0	0	0V41.3,72
0	0	0	0	0	0	0	0	0	45	70	75	67	47	27	13	9	5	3	1	0	0	0	0V41.3,73
0	0	0	0	0	0	0	0	0	62	115	157	186	174	135	86	48	20	6	1	0	0	0	0V41.3,74
0	0	0	0	0	0	0	0	0	42	91	142	191	217	220	206	156	90	49	17	0	0	0	0V41.3,75
0	0	0	0	0	0	0	0	0	3	12	41	82	127	168	192	174	157	66	26	0	0	0	0V41.3,76
0	0	0	0	0	0	0	0	0	3	5	8	11	18	44	73	86	53	42	19	0	0	0	0V41.3,77
0	0	0	0	0	0	0	0	0	3	5	8	11	12	12	12	10	6	3	1	0	0	0	0V41.3,78

CONSOLIDATED NATURAL GAS SERVICE COMPANY

TABLE 11-11

```
A41.3, 1      97 176 214 198  97 198 214 176 267
A41.3, 2      30 177 227 174 111 174 227 177 268
A41.3, 3      30 196 227 196 196 196 227 196 262
A41.3, 4      32  98 208 227 234 227 208  98 215
A41.3, 5      27  96 199 248 234 248 199  96 180
A41.3, 6      24  29 147 230 246 230 147  29 129
A41.3, 7      22  22 125 218 243 218 125  22 111
SER440        36 163 216 170 179 170 216 163 262
Z41.3, 1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
Z41.3, 2  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
Z41.3, 3  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
Z41.3, 4  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
Z41.3, 5  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
Z41.3, 6  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
Z41.3, 7  0  0  0  0  0  0  3 17  8 70 10 68  9 70  3 76  0  0  0  0  0  0  0
Z41.3, 8  0  0  0  0  6 95 14 87 19 80 21 77 19 79 14 86  6 95  0  0  0  0  0
Z41.3, 9  3126 10114 17106 25 97 30 89 32 86 31 89 25 96 17106 10113  3120  0  0
Z41.3,10 12131 19125 28117 36108 41100 44 96 42 99 36107 28117 20125 12131  9133
Z41.3,11 20143 28138 37131 46122 52113 55109 53112 47121 37131 28138 20143 17145
Z41.3,12 25157 34154 44149 55141 62132 64128 62132 55140 44149 34154 26157 22158
Z41.3,13 28173 37172 48170 60167 69163 71160 68162 60166 48170 38171 29173 25173
Z41.3,14 28189 37190 48192 59196 68205 71203 68201 60196 48192 38190 28189 25188
Z41.3,15 25204 34208 44213 54221 61230 64234 61230 55222 44213 34208 25204 22203
Z41.3,16 19218 27223 36230 45239 51248 54253 52249 46240 36230 27223 19218 16216
Z41.3,17 11230 19236 27244 35253 42261 43265 41262 35254 27244 19236 12230  9228
Z41.3,18  2241  9247 16255 24264 29272 31275 30272 24265 16255  9247  0  0  0  0
Z41.3,19  0  0  0  0  5265 13274 18281 20284 18282 13275  5265  0  0  0  0  0  0
Z41.3,20  0  0  0  0  0  0  2284  7290  9293  8291  2285  0  0  0  0  0  0  0  0
Z41.3,21  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
Z41.3,22  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
Z41.3,23  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
Z41.3,24  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
  2  2  2  2  2  2  2  6  9  9 10 10 11 12 11 11 11 11 10 10  9  6  3  2T41.3,11
  7  6  5  4  4  3  3  2  3  5  6  6  7  8  9  9 10 10 10 11 11 11  8T41.3,12
  9  9  8  8  7  6  6  6  5  5  5  5  5  5  6  6  7  7  7  8  9  9  9  9T41.3,13
  8  8  8  8  7  7  7  7  7  6  6  6  6  6  6  6  7  7  7  7  7  8  8  8T41.3,14
  2  2  2  2  2  1  4 16 30 37 37 31 24 20 16 15 14 12 11  8  6  5  3  3T41.3,21
  8  7  6  5  4  3  3  3  6 11 16 20 22 23 22 21 20 19 18 15 14 13 11  9T41.3,22
 14 13 13 12 10  9  9  8  8  8  8 10 11 12 14 15 16 17 17 17 17 16 16 15T41.3,23
 14 13 13 13 12 12 11 11 11 11 10 10 12 12 12 13 13 14 14 15 15 15 15 14T41.3,24
  3  3  2  2  2  1  4 18 36 48 53 51 42 32 23 19 17 14 13  9  7  6  4  3T41.3,31
 11  9  8  7  6  5  4  4  7 14 20 27 31 34 33 31 29 27 24 22 19 17 15 12T41.3,32
 19 18 17 16 14 13 12 11 10 11 11 13 14 17 19 21 23 24 23 23 23 22 22 20T41.3,33
 19 19 18 18 17 16 16 15 15 14 14 14 16 16 17 18 19 19 20 20 20 20 20 19T41.3,34
  3  3  2  2  2  1  3 11 23 34 43 46 44 39 30 23 19 15 13 10  7  6  4  3T41.3,41
 11 10  8  7  6  5  4  4  5 10 14 20 24 29 31 31 30 27 25 23 20 18 15 13T41.3,42
 19 18 17 16 14 13 12 11 10 10 10 11 12 14 16 18 20 22 22 22 22 22 21 20T41.3,43
 18 18 17 17 16 16 15 14 14 14 13 13 14 15 15 16 17 18 18 18 19 19 19 18T41.3,44
  3  2  2  2  2  1  2  2  4  8 14 21 28 33 34 33 29 22 17 11  8  6  4  3T41.3,51
 11 10  8  7  6  5  4  4  4  4  5  7  9 13 17 20 23 24 24 22 20 18 15 13T41.3,52
 16 15 15 14 12 11 11  9  9  9  8  8  7  7  8 10 11 14 15 16 17 17 17 16T41.3,53
 14 14 14 13 13 13 12 12 11 11 10 10 10 10 10 10 11 12 13 13 14 14 14 14T41.3,54
  6  4  4  4  3  2  3  3  5  6  9 10 13 21 30 39 45 47 45 35 23 14  9  7T41.3,61
 21 18 15 13 11  9  8  7  6  6  6  7  7  9 12 15 20 25 33 32 33 31 28 24T41.3,62
 23 23 22 20 19 17 17 15 14 14 12 12 11 10 10 10 11 13 15 16 19 21 23 23T41.3,63
 19 19 19 19 18 18 17 17 17 16 15 15 14 14 14 13 14 14 15 16 16 17 18 18T41.3,64
  7  5  5  4  4  3  3  3  5  7  9 10 11 13 21 32 44 52 56 48 32 19 12  9T41.3,71
 24 21 18 15 13 11  9  8  7  7  7  7  7  9 10 12 16 21 28 33 36 35 32 28T41.3,72
 25 25 24 23 21 20 19 17 16 15 14 13 12 11 11 11 11 13 14 15 19 21 24 24T41.3,73
 20 20 20 20 20 19 19 18 18 17 17 16 16 15 15 14 14 15 15 16 16 18 19 19T41.3,74
  5  4  4  3  3  2  2  3  5  6  8 10 10 12 12 17 26 34 41 38 25 15  9  6T41.3,81
 18 15 15 11  9  8  7  6  5  6  6  6  6  8  9  9 11 14 18 23 25 25 23 20T41.3,82
 18 18 17 16 15 14 14 12 11 11 10 10  9  9  8  8  9 10 10 11 13 15 17 17T41.3,83
 14 14 15 15 14 14 14 13 13 13 12 12 11 11 11 11 11 11 11 12 12 13 14 14T41.3,84
  6  4  1  0  0  0  0  1  3 11 21 32 42 51 58 62 63 60 54 44 33 23 15 10R41.3,11
  6  4  1  0  0  0  0  1  4 11 21 32 42 51 58 62 63 60 54 44 33 23 15 10R41.3,12
 32 28 24 21 19 16 14 11  9  8  8  9 13 17 22 28 32 37 40 42 43 42 38 35R41.3,13
 26 23 21 19 16 15 13 11 11 12 14 16 20 24 29 33 36 38 39 38 36 34 32 29R41.3,14
 26 23 21 19 16 15 13 12 11 12 14 16 20 24 28 33 36 38 39 38 36 34 32 29R41.3,15
  1 -6-13-20-25-29-34-37-39-39-36-31-23-13 -3  8 17 23 28 29 27 22 16  9R41.3,21
  9  3 -3 -9-15-20-25-29-33-35-35-33-29-23-15 -6  3 11 17 21 23 22 19 15R41.3,22
  7  5  2 -1 -4 -8-11-15-18-21-23-23-23-21-18-14-10 -5 -1  3  6  8  9  8R41.3,23
  2  1  1  0 -1 -1 -1  0  2  5  8 12 15 18 19 20 19 18 16 12 10  8  6  4DT020
```

TABLE 11-12

0	0	0	0	0	0	0	0	0	3	6	10	12	14	14	13	10	6	3	1	0	0	0	0M1,11D 1
0	0	0	0	0	0	0	0	2	5	8	11	13	14	14	13	10	6	3	1	0	0	0	0M1,11D 2
0	0	0	0	0	0	0	0	8	60	84	89	78	52	29	15	16	6	3	1	0	0	0	0M1,11D 3
0	0	0	0	0	0	0	0	9	75	131	172	197	178	135	86	48	20	5	1	0	0	0	0M1,11D 4
0	0	0	0	0	0	0	0	5	50	99	149	197	220	222	204	165	97	55	21	1	0	0	0M1,11D 5
0	0	0	0	0	0	0	0	0	4	12	40	81	127	171	198	192	120	76	34	1	0	0	0M1,11D 6
0	0	0	0	0	0	0	0	0	3	6	10	13	20	48	81	102	70	52	26	1	0	0	0M1,11D 7
0	0	0	0	0	0	0	0	0	3	6	10	12	14	14	13	13	8	5	3	0	0	0	0M1,11D 8
0	0	0	0	0	0	0	0	0	3	11	25	42	59	75	86	87	78	63	46	28	14	4	0M1,11D 9
0	0	0	0	0	0	0	0	0	3	6	10	12	14	14	13	10	6	3	1	0	0	0	0M1,11D10
0	0	0	0	0	0	0	0	3	6	10	13	16	17	17	17	14	10	6	3	1	0	0	0M2,10D 1
0	0	0	0	0	0	0	0	20	21	21	25	20	17	17	16	14	10	6	3	1	0	0	0M2,10D 2
0	0	0	0	0	0	0	0	56	100	124	130	95	62	35	19	14	10	6	3	1	0	0	0M2,10D 3
0	0	0	0	0	0	0	0	58	117	166	205	205	175	126	78	44	19	6	3	1	0	0	0M2,10D 4
0	0	0	0	0	0	0	0	22	61	106	154	191	210	212	196	164	114	64	31	9	0	0	0M2,10D 5
0	0	0	0	0	0	0	0	3	6	11	34	73	119	166	202	212	181	119	65	24	0	0	0M2,10D 6
0	0	0	0	0	0	0	0	3	6	10	13	16	24	56	96	131	136	89	58	24	0	0	0M2,10D 7
0	0	0	0	0	0	0	0	3	6	10	13	16	17	17	17	23	31	18	15	9	0	0	0M2,10D 8
0	0	0	0	0	0	0	0	2	9	24	44	68	92	115	133	131	119	96	74	49	28	11	2M2,10D 9
0	0	0	0	0	0	0	0	3	6	10	13	16	17	17	16	14	10	6	3	1	0	0	0M2,10D10
0	0	0	0	0	0	0	2	5	9	13	17	20	21	21	20	18	14	10	5	3	1	0	0M 3,9D 1
0	0	0	0	0	0	0	21	48	52	48	42	29	22	21	20	18	14	9	5	2	0	0	0M 3,9D 2
0	0	0	0	0	0	0	33	95	136	160	150	105	67	39	22	18	14	9	5	2	0	0	0M 3,9D 3
0	0	0	0	0	0	0	20	84	135	179	201	199	155	106	66	37	19	9	5	2	0	0	0M 3,9D 4
0	0	0	0	0	0	0	3	20	51	89	129	161	179	181	167	137	96	55	27	9	1	0	0M 3,9D 5
0	0	0	0	0	0	0	1	5	9	14	27	60	102	146	184	203	193	135	82	41	9	0	0M 3,9D 6
0	0	0	0	0	0	0	1	5	9	13	17	20	26	61	104	146	171	133	87	48	12	0	0M 3,9D 7
0	0	0	0	0	0	0	1	5	9	13	17	20	21	21	23	39	60	51	38	25	7	0	0M 3,9D 8
1	0	0	0	0	0	0	1	6	20	41	68	97	123	155	172	174	160	135	105	74	46	23	8M 3,9D 9
0	0	0	0	0	0	0	1	5	9	13	17	20	21	21	20	18	14	9	5	2	0	0	0M 3,9D10
0	0	0	0	0	0	0	6	9	14	19	22	24	25	25	25	22	20	17	9	6	3	0	0M 4,8D 1
0	0	0	0	0	0	2	53	77	87	83	62	42	29	26	25	22	19	15	8	5	2	0	0M 4,8D 2
0	0	0	0	0	0	3	67	118	156	178	154	107	70	43	27	22	19	15	8	5	2	0	0M 4,8D 3
0	0	0	0	0	0	1	44	89	131	167	174	157	122	82	53	32	20	15	8	5	2	0	0M 4,8D 4
0	0	0	0	0	0	0	4	12	32	60	90	116	132	134	120	94	63	38	17	6	2	0	0M 4,8D 5
0	0	0	0	0	0	0	4	8	13	19	24	46	80	117	152	172	172	143	85	49	19	0	0M 4,8D 6
0	0	0	0	0	0	0	4	8	13	18	22	24	33	64	105	147	179	174	103	69	29	0	0M 4,8D 7
0	0	0	0	0	0	0	4	8	13	18	22	24	25	26	35	60	87	100	66	47	22	0	0M 4,8D 8
4	0	0	0	0	0	0	4	14	33	59	91	125	160	188	203	205	192	167	133	98	66	38	17M 4,8D 9
0	0	0	0	0	0	0	4	8	13	18	22	24	25	25	25	22	19	15	8	5	2	0	0M 4,8D10
0	0	0	0	0	0	11	18	20	25	26	26	27	28	28	28	26	24	27	25	15	10	4	0M 5,7D 1
0	0	0	0	0	0	33	77	106	120	106	76	53	36	29	26	26	23	19	12	7	3	1	0M 5,7D 2
0	0	0	0	0	0	34	90	137	172	179	151	106	71	45	30	26	23	19	12	7	3	1	0M 5,7D 3
0	0	0	0	0	0	15	50	87	123	146	148	130	98	68	46	30	23	19	12	7	3	1	0M 5,7D 4
0	0	0	0	0	0	2	7	12	23	42	63	82	95	96	85	65	45	29	15	8	3	1	0M 5,7D 5
0	0	0	0	0	0	2	7	12	17	22	26	38	64	95	125	146	149	130	90	52	24	6	0M 5,7D 6
0	0	0	0	0	0	2	7	12	17	22	25	28	36	65	104	144	177	182	140	86	46	13	0M 5,7D 7
0	0	0	0	0	0	2	7	12	17	22	25	27	29	30	46	75	105	126	107	70	41	13	0M 5,7D 8
10	1	0	0	0	0	1	8	22	45	73	107	144	179	206	220	222	210	186	152	116	81	50	26M 5,7D 9
0	0	0	0	0	0	2	7	12	17	22	25	27	28	28	28	26	23	19	12	7	3	1	0M 5,7D10
0	0	0	0	0	0	16	24	26	32	30	28	29	29	29	29	28	27	33	34	20	15	7	0M 6D 1
0	0	0	0	0	0	42	85	115	131	114	82	58	39	31	29	27	24	20	14	8	4	1	0M 6D 2
0	0	0	0	0	0	43	95	140	174	177	148	104	71	46	31	27	24	20	14	8	4	1	0M 6D 3
0	0	0	0	0	0	17	49	83	116	136	136	118	88	63	43	30	24	20	14	8	4	1	0M 6D 4
0	0	0	0	0	0	3	8	14	22	36	53	69	80	81	71	55	40	27	16	9	4	1	0M 6D 5
0	0	0	0	0	0	3	8	13	19	24	28	37	59	87	114	134	138	122	87	50	25	7	0M 6D 6
0	0	0	0	0	0	3	8	13	19	24	26	29	37	65	103	142	174	182	149	91	52	18	0M 6D 7
0	0	0	0	0	0	3	8	13	19	24	26	28	33	33	51	81	112	135	123	78	48	18	0M 6D 8
12	3	0	0	0	0	2	15	26	49	79	113	150	185	211	225	220	215	191	159	122	87	55	30M 6D 9
0	0	0	0	0	0	3	8	13	19	24	26	28	29	29	29	27	24	20	14	8	4	1	0M 6D10
0	0	0	0	0	0	0	0	3	5	8	11	12	12	11	9	5	3	1	0	0	0	0	0M 12D 1
0	0	0	0	0	0	0	0	0	3	6	8	11	12	12	11	9	5	3	1	0	0	0	0M 12D 2
0	0	0	0	1	0	0	0	0	35	70	75	67	47	27	15	9	5	3	1	0	0	0	0M 12D 3
0	0	0	0	1	0	0	1	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	0	0	0	0M 12D 4
0	0	0	0	0	0	0	1	0	42	91	142	179	212	222	220	206	156	90	40	17	0	0	0	0M 12D 5
0	0	1	0	0	0	0	0	0	1	3	12	41	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0	0	0	0M 12D 6
0	0	0	0	0	0	0	0	0	3	5	8	11	18	44	73	86	58	42	19	0	0	0	0M 12D 7
0	0	0	0	0	0	0	0	0	3	5	8	11	12	12	12	10	6	3	1	0	0	0	0M 12D 8
0	0	0	0	0	0	0	0	0	2	8	19	33	47	60	69	70	63	51	36	22	10	2	0M 12D 9
0	0	0	0	0	0	0	0	0	3	5	8	11	12	12	11	9	5	3	1	0	0	0	0M 12D10

TABLE 11-13

```
CONSOLIDATED NATURAL GAS SYSTEM                          VER        02/07/79        PAGE        SERIAL
PANEL3                                                   10.0       14.09.18          1         019955

                                          PANVALET
                                THE PROGRAM MANAGEMENT AND SECURITY SYSTEM

              PROGRAMS AND ALL SUPPORTING MATERIALS COPYRIGHT 1975 BY PANSOPHIC SYSTEMS, INCORPORATED

**INSERT WORK
      INTEGER W1(24),W2(24),S1(24),S2(24)
      REAL CARD(20)
      READ(5,1) IWDB,IWDP,ISDB,ISDP,IDD
  1   FORMAT(5I5)
      DO 7 I=1,24
      W1(I)=IWDB
      W2(I)=IWDP
      S1(I)=ISDB
      IF(I.EQ.1) S1(I)=S1(I)-IDD
      S2(I)=ISDP
  7   CONTINUE
  10  READ(3,2,END=11) CARD
      WRITE(1,2) CARD
  2   FORMAT(20A4)
      GO TO 10
  11  DO 16 I=1,2
  16  WRITE(1,3) W1,W2
  3   FORMAT(24I3/24I3/)
      DO 17 I=1,10
  17  WRITE(1,3) S1,S2
      STOP
      END
***** ABOVE ACTION SATISFACTORILY COMPLETED *****
```

TABLE 11-14

```
FORTRAN IV G1  RELEASE 2.0              MAIN              DATE - 79038          14/08/23              PAGE 0001

0001                INTEGER W1(24),W2(24),S1(24),S2(24)
0002                REAL CARD(20)
0003                READ(5,1) IWDB,IWDP,ISDB,ISDP,IDU
0004            1   FORMAT(5I5)
0005                DO 7 I=1,24
0006                W1(I)=IWDB
0007                W2(I)=IWDP
0008                S1(I)=ISDB
0009                IF(I.EQ.1) S1(I)=S1(I)-IDU
0010                S2(I)=ISDP
0011            7   CONTINUE
0012           10   READ(3,2,END=11) CARD
0013                WRITE(1,2) CARD
0014            2   FORMAT(20A4)
0015                GO TO 10
0016           11   DO 16 I=1,2
0017           16   WRITE(1,3) W1,W2
0018            3   FORMAT(24I3/24I3/)
0019                DO 17 I=1,10
0020           17   WRITE(1,3) S1,S2
0021                STOP
0022                END
```

SUBPROGRAMS CALLED

SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION
IBCOM	00								

SCALAR MAP

SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION
IWDB	B4	IWDP	B8	ISDB	BC	ISDP	C0	IDU	C4
I	C8								

ARRAY MAP

SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION
W1	CC	W2	12C	S1	18C	S2	1EC	CARD	24C

FORMAT STATEMENT MAP

SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION
1	29C	2	2A2	3	2AB				

STATEMENT LABEL MAP

LOCATION	STA NUM	LABEL	LOCATION	STA NUM	LABEL	LOCATION	STA NUM	LABEL
000318	3		000358	5		000364	6	
000360	7		000374	8		00037C	9	
000396	10		00039E	11	7	000386	12	10
0003DC	13		0003FC	15		000402	16	11
00040A	17	16	00044C	19		000454	20	17
000494	21							

```
*OPTIONS IN EFFECT*  NOTERM,NOID,EBCDIC,SOURCE,NOLIST,NODECK,LOAD,MAP,NOTEST
*OPTIONS IN EFFECT*  NAME = MAIN     , LINECNT =       55
*STATISTICS*     SOURCE STATEMENTS =       22,PROGRAM SIZE =      1186
*STATISTICS*  NO DIAGNOSTICS GENERATED
```

TABLE 11-15

```
F64-LEVEL LINKAGE EDITOR OPTIONS SPECIFIED XREF,LET,LIST
        DEFAULT OPTION(S) USED -  SIZE=(196608,65536)
```

CROSS REFERENCE TABLE

CONTROL SECTION

NAME	ORIGIN	LENGTH
MAIN	00	4A2
IHNECOMH*	4A8	F8C
IHNCOMH2*	1438	715
IHNFCVTH*	1B50	B6F
IHNEFNTH*	26C0	548
IHNEFIOS*	2C08	FF8
IHNFIOS2*	3C00	5B8
IHNOOPT. *	41B8	368
IHNFCONI*	4520	2E5
IHNFCOND*	4808	4A2
IHNERRM *	4CB0	5FC
IHNOATBL*	52B0	328
IHNFTEN *	55D8	198
IHNETRCH*	5770	2A6

ENTRY

NAME	LOCATION	NAME	LOCATION	NAME	LOCATION	NAME	LOCATION
IBCOM	4D4	FDIOCS	590	INTSWTCH	140E		
SEQDASD	1866						
ADCON	1B50	FCVAOUTP	1BFA	FCVLOUTP	1C8A	FCVZOUTP	1DE6
FCVIOUTP	218E	FCVEOUTP	2280	FCVCOUTP	23CA	INT6SWCH	2640
ARITH	26C0	ADJSWTCH	2A5C				
FIOCS	2C08	FIOCSBEP	2C0E				
FQCONI	4520						
FQCOND	4808						
ERRMON	4CB0	IHNERRE	4CC8				
FTEN	55D8						
IHNTRCH	5770	ERRTRA	5778				

LOCATION	REFERS TO SYMBOL	IN CONTROL SECTION
60	IBCOM	IHNECOMH
5E8	IHNCOMH2	IHNCOMH2
130C	FIOCS	IHNEFIOS
1338	ADJSWTCH	IHNEFNTH
1430	IHNCMSE	$UNRESOLVED(W)
1320	FCVLOUTP	IHNFCVTH
1328	FCVCOUTP	IHNFCVTH
1330	FCVZOUTP	IHNFCVTH
12EC	IHNCOMH2	IHNCOMH2
12C4	IHNCOMH2	IHNCOMH2
12CC	IHNCOMH2	IHNCOMH2
1600	IHNECOMH	IHNECOMH
172C	IHNECOMH	IHNECOMH
147C	IBCOM	IHNECOMH
19BD	IHNECOMH	IHNECOMH

LOCATION	REFERS TO SYMBOL	IN CONTROL SECTION
590	SEQDASD	IHNCOMH2
1314	ADCON	IHNFCVTH
1318	ARITH	IHNEFNTH
1334	IHNOOPT	IHNOOPT
131C	FCVEOUTP	IHNFCVTH
1324	FCVIOUTP	IHNFCVTH
132C	FCVAOUTP	IHNFCVTH
12C0	IHNERRE	IHNERRM
12F0	IHNERRM	IHNERRM
12C8	IHNCOMH2	IHNCOMH2
1200	IHNCOMH2	IHNCOMH2
1729	IHNECOMH	IHNECOMH
1480	IHNERRM	IHNERRM
19A0	IHNECOMH	IHNECOMH
19C0	IHNECOMH	IHNECOMH

TABLE 11-16

LOCATION	REFERS TO SYMBOL	IN CONTROL SECTION
2480	IBCOM	IHNECOMH
2500	FQCOND	IHNFCOND
2AAC	IBCOM	IHNECOMH
2A58	INT6SWCH	IHNFCVTH
2AB8	ADCON	IHNFCVTH
2024	IHNERRM	IHNERRM
206C	IHNFIOS2	IHNFIOS2
3A18	IBCOM	IHNECOMH
3A44	IHNFIOS2	IHNFIOS2
479C	FTEN	IHNFTEN
529C	IHNOOPT	IHNOOPT
52A4	IHNTRCH	IHNETRCH
5900	LDFID	$UNRESOLVED(W)
58FC	ADCON	IHNFCVTH

LOCATION	REFERS TO SYMBOL	IN CONTROL SECTION
24AC	IHNERRM	IHNERRM
2504	FQCOMI	IHNFCONI
2AB0	INTSWTCH	IHNECOMH
2A54	IHNOOPT	IHNOOPT
2AB4	FIOCS	IHNEFIOS
2D68	IHNERRM	IHNERRM
3A0C	IHNOATBL	IHNOATBL
3A20	IHNFIOS2	IHNFIOS2
3BF9	IHNFIOS2	IHNFIOS2
4BF8	FTEN	IHNFTEN
52A0	IBCOM	IHNECOMH
52A8	FIOCSBEP	IHNEFIOS
58F8	IBCOM	IHNECOMH
5904	FIOCSBEP	IHNEFIOS

ENTRY ADDRESS 00

TOTAL LENGTH 5A18
****MAIN DOES NOT EXIST BUT HAS BEEN ADDED TO DATA SET
AUTHORIZATION CODE IS 0.

TABLE 11-17

ZONE THERMAL LOADS PROGRAM FOR ZTL RUN FOR CLEVELAND OHIO

NZ	NWTC	NGTC	NOW	NWS	NWA	NKTW	NPST	NPV	NDTC	NDPC	MNDT	SLAT	SLON	ACLR	GRR	WKY	NWD	WDY	NMO	KCC	KSP	KLS
1	1	1	4	0	0	1	1	3	2	1	0	0.	0.	0.0	0.0	2	1	1	0	0	0	0

ZN NO	ZAREA SQFT	LENGTH FT	WIDTH FT	PEOPLE MBH	PCT LAT	NUM PEO	LIGHTS MBH	WATTS /SQFT	PCT R/A	EQUIP MBH	MISC MBH	PCT LAT	DUPL ZONES	ZONE ID LABEL
1	37800.	0.0	0.0	0.0	0.	378.	0.0	3.75	40.	26.33	0.0	0.	0.0	FLEISHMAN-B 90 * 70

WALL TYPE	WIN U-F	DECK SUM	UNIT WT	C-S MOD	WALL TYPE	WIN U-F	DECK SUM	UNIT WT	C-S MOD	WALL TYPE	WIN U-F	DECK SUM	UNIT WT	C-S MOD	WALL TYPE	WIN U-F	DECK SUM	UNIT WT	C-S MOD
1	0.27	0.0	110.	1.00	0	0.0	0.0	0.	0.0	0	0.0	0.0	0.	0.0	0	0.0	0.0	0.	0.0

GLSS TYPE	WIN U-F	DECK SUM	RAD MOD	GLSS TYPE	WIN U-F	DECK SUM	RAD MOD	GLSS TYPE	WIN U-F	DECK SUM	RAD MOD	GLSS TYPE	WIN U-F	DECK SUM	RAD MOD	GLSS TYPE	WIN U-F	DECK SUM	RAD MOD
1	1.13	0.0	0.81	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0	0.0	0.0	0.0

OUTSIDE WALL DATA - BASIC

ZN	OW	WFA	WTA	WTN	WAREA	W-L	W-H	GTN	PC-WA	G-L	G-H	NO	CFM	GAR	SDF	WRAPCT
1	4	270.	0.	1	0.	90.	50.	1	32.1	0.	0.	0.	0.0	0.	0.	29.0
1	3	180.	0.	1	0.	70.	60.	1	25.7	0.	0.	0.	0.0	0.	0.	27.0
1	2	90.	0.	1	0.	90.	60.	1	38.6	0.	0.	0.	0.0	0.	0.	33.0
1	1	0.	0.	1	0.	70.	60.	1	25.7	0.	0.	0.	0.0	0.	0.	27.0

ZN	ROOF AREA	R-L	R-W	U-F	DEC	RW	RSM	PCRA	INTERIOR WALL 1 AREA	W-L	W-H	U-F	NO	PCI	INTERIOR WALL 2 AREA	W-L	W-H	U-F	NO	PCI
1	0.	90.	70.	0.25	0.02	15.0	1.0	99.0	0.0	90.0	10.0	0.27	1	0.	0.0	0.0	0.0	0.0	0	0.

PARTY SPACE TEMPERATURE PROFILES FOR INTERIOR WALLS

NO	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	37.	39.	42.	45.	48.	53.	60.	62.	57.	53.	47.	42.

PERCENTAGE VARIATION PROFILES

1	80./24	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0
2	5./24	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0
3	100./24	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0

PERCENTAGE VARIATION PROFILES BY HOUR

NO	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
1	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.
2	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
3	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.

DAY TYPE DESCRIPTION AND DISTRIBUTION

DT	R-DB	H-DP	PEO	LTS	EQP	MIS	J	F	M	A	M	J	J	A	S	O	N	D	ZN/ZN	ZN/ZN	ZN/ZN	ZN/ZN	ZN/ZN	ZN/ZN
1	75.	55.	1	3	1	1		*	*	*	*	*	*	*	*	*	*	*	1/ 1	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0
2	75.	0.	0	2	0	2	*	*											1/ 1	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0

DESIGN POINT WEATHER DATA

MO	DT	HR	DRYB	DEWP	MO	DT	HR	DRYB	DEWP	ZN/ZN	ZN/ZN	ZN/ZN	ZN/ZN	ZN/ZN	ZN/ZN
1	2	6	2.	-8.	7	1	11	86.	72.	1/ 1	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0

TABLE 11-18

ZONE THERMAL LOADS PROGRAM FOR ZIL RON FOR CLEVELAND OHIO

ZONE 1 FLEISHMAN-B 90 * 70

MONTH	PEAK HEATING LOADS SENSIBLE BTU/HR	HOUR TIME	TEMP DB/ DP	LATENT BTU/HR	PEAK COOLING LOADS SENSIBLE BTU/HR	HOUR TIME	TEMP DB/ DP	LATENT BTU/HR
JAN	-615293.	7AM	2/ -8	0.	0.		0/ 0	0.
FEB	-612030.	7AM	2/ -8	0.	0.		0/ 0	0.
MAR	0.		0/ 0	0.	916813.	11AM	91/ 73	60480.
APR	0.		0/ 0	0.	907442.	10AM	91/ 73	60480.
MAY	0.		0/ 0	0.	902772.	10AM	91/ 73	60480.
JUN	0.		0/ 0	0.	900886.	10AM	91/ 73	60480.
JUL	0.		0/ 0	0.	905688.	10AM	91/ 73	60480.
AUG	0.		0/ 0	0.	911573.	10AM	91/ 73	60480.
SEP	0.		0/ 0	0.	920458.	11AM	91/ 73	60480.
OCT	0.		0/ 0	0.	898822.	11AM	91/ 73	60480.
NOV	0.		0/ 0	0.	841361.	12 N	91/ 73	60480.
DEC	0.		0/ 0	0.	811221.	12 N	91/ 73	60480.

TABLE 11-19

ZONE THERMAL LOADS PROGRAM FOR ZTL RUN FOR CLEVELAND OHIO

ZONE 1 FLEISHMAN-B 90 + 70

COMPONENTS OF THE PEAK THERMAL LOADS OF THE YEAR (BTU/HR)

	PEAK HOUR HEATING LOAD		PEAK HOUR COOLING LOAD	
	WINTER DESIGN MO/DY/TIME	OVERALL PEAK MO/DY/TIME	SUMMER DESIGN MO/DY/TIME	OVERALL PEAK MO/DY/TIME
AMBIENT TEMPERATURE	1/ 2/ 5AM	1/ 2/ 7AM	7/ 1/10AM	9/ 1/11AM
DRY BULB/DEW POINT	2/ -8	2/ -8	86/ 72	91/ 73
TRANSMISSION AND SOLAR LOADS				
OUTSIDE WALLS	-121308.	-150253.	19776.	33887.
ROOF	-1084.	-1142.	221.	378.
GLASS TRANSMISSION	-469178.	-469178.	70698.	102834.
GLASS SOLAR	0.	0.	387411.	400795.
INTERIOR WALL TRANS	-9234.	-9234.	-3645.	-4374.
INTERNAL LOAD				
SENSIBLE	14514.	14514.	386939.	386939.
LATENT	0.	0.	60480.	60480.
INFILTRATION LOAD				
SENSIBLE	0.	0.	0.	0.
LATENT	0.	0.	0.	0.
TOTAL ZONE LOAD				
SENSIBLE	-586290.	-615293.	861401.	920458.
LATENT	0.	0.	60480.	60480.
DIRECT RETURN AIR LOAD				
INTERNAL HEAT	9676.	9676.	193517.	193517.
ROOF AND WALL HEAT	-157244.	-174839.	30247.	51409.

ANNUAL SUMMARY OF PEAK THERMAL LOADS, ALL ZONES (BTU/HR)

	PEAK HOUR HEATING LOAD				PEAK HOUR COOLING LOAD			
ZONE	SENSIBLE HEAT	SENSIBLE + LATENT HEAT	MO/DY/TIME	DB/ DP	SENSIBLE HEAT	SENSIBLE + LATENT HEAT	MO/DY/TIME	DB/ DP
1	-615293.	-615293.	1/ 2/ 7AM	2/ -8	920458.	980938.	9/ 1/11AM	91/ 73

TABLE 11-20

ZONE THERMAL LOADS PROGRAM FOR ZTL RUN FOR CLEVELAND OHIO

TOTALS FOR ALL ZONES IN THIS RUN (INCLUDING ZONE MULTIPLIERS)

FLOOR AREA, SQ FT	37800.
OUTSIDE WALL AREA (EXCL GLS), SQ FT	12612.
GLASS AREA, SQ FT	5688.
ROOF AREA, SQ FT	6300.

PCT AREAS BY DIRECTION NUMBER	1	2	3	4	5	6	7	8	9
WALLS	24.7	0.0	26.3	0.0	24.7	0.0	24.2	0.0	0.0
GLASS	19.0	0.0	36.6	0.0	19.0	0.0	25.4	0.0	0.0
GLASS + EQUIV WALLS	19.3	0.0	32.7	0.0	17.8	0.0	30.1	0.0	0.0
GLASS + EQUIV ROOF	19.0	0.0	36.6	0.0	19.0	0.0	25.4	0.0	0.1
GLASS + EQV WALLS & ROOF	19.3	0.0	32.7	0.0	17.8	0.0	30.1	0.0	0.1

	SUM OF INDIVIDUAL ZONE PEAKS HEATING, MBH	SUM OF INDIVIDUAL ZONE PEAKS COOLING, MBH	SUM OF SIMULTANEOUS (DIVERSIFIED) PEAKS HEATING, MBH	SUM OF SIMULTANEOUS (DIVERSIFIED) PEAKS COOLING, MBH	
MO/DAY TYP/TIME			1/ 2/ 7AM	9/ 1/11AM	
DRY BULB/DEW PT			2/ -8	91/ 73	
OUTSIDE WALL TRANSMISSION			-176.3	7.2	16.4
ROOF TRANSMISSION			-1.1	-0.0	0.2
GLASS TRANSMISSION			-469.2	102.8	102.5
INTERIOR WALLS			-9.2	-4.4	-0.6
TOTAL TRANSMISSION			-655.9	105.7	115.0
OUTSIDE WALL SOLAR			26.1	26.6	
ROOF SOLAR			0.0	0.4	
GLASS SOLAR			0.0	400.8	
TOTAL SOLAR			26.1	427.8	
INTERNAL, PEOPLE SENSIBLE			0.0	75.6	
INTERNAL, LIGHTS			14.5	290.3	
INTERNAL, EQUIPMENT			0.0	21.1	
INTERNAL, MISC SENSIBLE			0.0	0.0	
INTERNAL, PEOPLE LATENT			0.0	60.5	
INTERNAL, MISC LATENT			0.0	0.0	
INFILTRATION, SENSIBLE			0.0	0.0	
INFILTRATION, LATENT			0.0	0.0	
RETURN, LIGHTS (NOT IN TOT)			9.7	193.5	
RETURN, TRANSMISSION (NOT IN TOT)			-186.1	2.7	
RETURN, SOLAR (NOT IN TOT)			11.2	48.7	
TOTAL SENSIBLE	-615.3	920.5	-615.3	920.5	
TOTAL LATENT	0.0	60.5	0.0	60.5	

PEAK INTERNAL PEOPLE (SENS + LAT), MBH	170.10		
PEAK INTERNAL LIGHTS (TOTAL), MBH	483.79	HIGHEST AMB DRY-BULB TEMP, F	91.
PEAK INTERNAL EQUIPMENT, MBH	26.33	HIGHEST WALL TRANS GAIN, MBH	16.4
PEAK INTERNAL MISC (SENS + LAT), MBH	0.0	HIGHEST ROOF TRANS GAIN, MBH	0.2
		LOWEST AMB DRY-BULB TEMP, F	2.
PEAK INFILTRATION, CFM	0.0	HIGHEST WALL TRANS LOSS, MBH	-176.3

TABLE 11-21

REVIEW OF DESIGN POINT REQUIREMENT FOR CLEVELAND OFFICE BUILDING DPR RUN

D. S. NO 1 3 AIR DISTRIBUTION SYSTEMS MODELED AS ONE

ANNUAL SUMMARY

	**** PEAK HEATING LOADS ****					******** PEAK COOLING LOADS *******					** DESIGN AIRFLOWS **		
ZN	SENS MBH	MO/DY/TIME	SENS + LAT MBH	MO/DY/TIME	TOT HRS	SENS TONS	MO/DY/TIME	SENS + LAT TONS	MO/DY/TIME	SH RATIO	TOT HRS	TOTAL SUPPLY AIR CFM	SPLY AIR CFM/ SQFT	MAXIMUM OUTSIDE AIR CFM
1	615.	1/ 1/ 7AM	615.	1/ 1/ 7AM	48	76.7	9/ 1/11AM	81.7	9/ 1/11AM	0.94	240	44857.	1.19	3780.
ALL	615.	1/ 1/ 7AM	615.	1/ 1/ 7AM	48	76.7	9/ 1/11AM	81.7	9/ 1/11AM	0.94	240	44857.	1.19	3780.
	615.*		615.*			76.7*		81.7*						

* SUM OF INDIVIDUAL ZONE PEAKS

	HEATING MBH	MO/DY/TIME	DBT/DPT	COOLING TONS	MO/DY/TIME	DBT/DPT
INDEPENDENT LOADS						
ESTIMATED PEAK OUTSIDE AIR LOAD, SENSIBLE	298.	1/ 1/12 M	2/ -8	5.4	3/ 1/ 1AM	91/ 73
LATENT	0.			13.2		
RETURN AIR LOAD AT O/A PEAK	141.			17.6		
ZONE LOAD (SENSIBLE + LATENT)	615.	1/ 1/ 7AM	2/ -8	81.7	9/ 1/11AM	91/ 73
TOTAL	1055.			118.0		
SIMULTANEOUS LOADS AT PEAK ZONE LOADS						
OUTSIDE AIR LOAD, SENSIBLE	298.	1/ 1/ 7AM	2/ -8	5.4	9/ 1/11AM	91/ 73
LATENT	0.			13.2		
RETURN AIR LOAD	151.			18.7		
ZONE LOAD (SENSIBLE + LATENT)	615.			81.7		
TOTAL	1065.			119.1		
			DBT/WBT			DBT/WBT
ENTERING CONDITIONS			65.7/ 58.1			81.0/ 65.0
LEAVING CONDITIONS			87.7/ 65.8			56.0/ 54.3

MAXIMUM SIMULTANEOUS AIRFLOW FOR ALL ZONES AT 19.0F DT (THERMAL LOADS ONLY), CFM 44857.

SUM OF MINIMUM SUPPLY AIRFLOWS, CFM 378.

SUM OF ZONE AREAS IN THIS DIST SYS 37800. SQ FT

TABLE 11-22

REVIEW OF DESIGN POINT REQUIREMENT FOR CLEVELAND OFFICE BUILDING DPR RUN

NDISTS 1 TOTAL NO OF ZONES ON TAPE 1 NO OF MONTHS TO RUN 0 NO OF DAYS/MO 0

DS NO	ZN /DS	STU KEY	H-R COOL	H-R HEAT	LABEL
1	1	0	62.	0.	3 AIR DISTRIBUTION SYSTEMS MODELED AS ONE

DS NO	ZN NO	FLOOR AREA	CEIL HT	MAX PEO	S-AIR DEL T	MIN S-AIR	OUTSIDE AIR REQUIREMENTS CFM/SF	CFM/PER	PC-AIRF	CHNGS/HR	NO TOTL ZONES	ZONE ID LABEL
1	1	37800.	8.0	378.	19.0	0.01	0.0	10.00	0.0	0.0	0.0	FLEISHMAN-B 90 * 70

REVIEW OF DESIGN POINT REQUIREMENT FOR CLEVELAND OFFICE BUILDING DPR RUN

D. S. NOS. 1

SUM OF ALL DISTRIBUTION SYSTEMS IN THIS RUN (DIVERSITY BETWEEN SYSTEMS NOT CONSIDERED)

TOTAL FLOOR AREA, SQ FT	37800.
TOTAL SUPPLY AIRFLOW, CFM	44857.
TOTAL OUTSIDE AIRFLOW, CFM	3780.
TOTAL ZONE HEATING (SENS + LAT), MBH	615.
TOTAL O/A SENSIBLE HEAT, MBH	298.
TOTAL O/A LATENT HEAT, MBH	0.
TOTAL RETURN AIR HEAT, MBH	151.
SUM OF ALL DISTRIB SYS HEATING, MBH	1065.
TOTAL ZONE COOLING (SENS + LAT), TONS	81.7
TOTAL O/A SENSIBLE COOL, TONS	5.4
TOTAL O/A LATENT COOL, TONS	13.2
TOTAL RETURN AIR COOL, TONS	18.7
SUM OF ALL DISTRIB SYS COOLING, TONS	119.1

TABLE 11-23

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISHMAN-B-120 TONS 93 • 70 CLEVELAND COMPOSITE WEATHER TAPE VAV NO ECON 06/08/79

SYS	TP	FLOOR	SOLAR	PIP	PCIPL	PILT	PCILTR	PCLTRH	PIE	PIM	PCIML	PPI	PPD	PBEA	PBEB	PHEC	KY
	8	37800.	427.8	136.1	44.	483.8	40.	0.	21.1	0.0	0.	39.5	6.4	6.	142.	40.	1

SOLAR AREA PERCENTAGES

D1	D2	D3	D4	D5	D6	D7	D8
19.	0.	33.	0.	18.	0.	30.	0.

TIME

H	SH	MO	HR	HSCAP	CSCAP
0.	0.	9	12	1126.	120.

SHUTOFF AND PRIMARY FUEL INTERRUPTION TEMPERATURES -- NO. OF DAYS

INTHST	INTCST	PFIT	HRS	JA	FE	MA	AP	MA	JU	JU	AU	SE	OC	NO	DE
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

HEATING LOADS

HIDB	HIDP	HDDB	HDDP	HDTL	TLHDU	HDSTU	TLHDL	HDSTL
72.	0.	2.	-8.	628.9	0.	0.	0.	0.

COOLING LOADS

CIDB	CIDP	CDDB	CDDP	CDTG	CDST	HRCD	SCDST	SHRCD
-75.	55.	91.	73.	115.0	56.	62.	0.	0.

RATKLM	RASOLM	SFDI	RFDI	HSF	KHSF
26.8	44.9	0.4	0.0	0.	0

AIRFLOW DATA

TSA	ZVFCM	ZVFHM	DAVMAX	DAMINC	DAMINH	DAMINS	TLEU	TLEL	TLCDU	CDTU	TLCDL	CDTL	CDTUO	VVMAF	EFFS	EFFL
53000.	0.	0.	3780.	3780.	3780.	3402.	0.	0.	0.	0.	0.	0.	0.	10.	0.	0.

ADDITIONAL SYSTEM DATA

REFR HEAT RATIO	NORMAL OPERATION..... MX TM	SUPL	HT	MN TM	SUPL	HT	SETBACK OPERATION..... MX TM	SUPL	HT	MN TM	SUPL	HT	EL KY	SY KY	PCT REDUCTION IN PEAK PROCESS..... J	F	M	A	M	J	J	A	S	O	N	D	PR KY	HUMID RS HI DP	HI AM	LO AM	HM KY	AR KY	INFIL CFM	IN KY
0.0	65		53.	-10		727.	65		53.	-10		727.	0	0	0.	0.	5.	10.	12.	15.	20.	20.	15.	10.	7.	5.	0	0	0	0	0	3	3402.	1

SHUTOFF AND SETBACK TIME SCHEDULES

NO	HR,DR	HR,DR	MO/MO	HR,DR	HR,DR	MO/MO	HR,DR	HR,DR	MO/MO	HR,DR	HR,DR	MO/MO	HR,DR	HR,DR	MO/MO	HR,DR	HR,DR	MO/MO	HR,DR	HR,DR	MO/MO
1	1, 5	20, 5	1/12	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0
2	1, 7	16, 9	1/12	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0
3	1,24	0, 0	1/12	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0
4	1, 7	20, 5	1/ 3	1, 5	20, 5	4/ 9	1, 7	20, 5	10/12	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0
5	1, 8	16, 9	1/ 3	1, 7	16, 9	4/ 9	1, 8	16, 9	10/12	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0
6	1,24	0, 0	6/ 9	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0
7	1,24	0, 0	1/ 3	1,24	0, 0	11/12	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0

SETBACK TEMPERATURE SCHEDULE

NO	TEMP	MO/MO	TEMP	MO/MO	TEMP	MO/MO	TEMP	MO/MO	TEMP	MO/MO	TEMP	MO/MO
1	70	1/12	0	0/ 0	0	0/ 0	0	0/ 0	0	0/ 0	0	0/ 0

PERCENTAGE VARIATION PROFILES

1	0., 6	1., 1	5., 1	90., 1	95., 1	100., 2	75., 1	90., 1	100., 2	95., 1	60., 1	40., 1	PEOPLE WEEKDAYS
1	10., 1	5., 4	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	
2	0., 6	1., 2	5., 1	20., 3	15., 1	20., 1	15., 1	10., 1	5., 6	0., 0	0., 0	0., 0	PEOPLE SATURDAY
3	5., 6	40., 1	80., 1	100.,13	75., 3	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	LIGHTS WEEKDAYS
4	5., 6	20., 1	60., 2	40., 1	30., 1	20., 1	15., 1	10., 1	5., 8	0., 0	0., 0	0., 0	LIGHTS SATURDAY
5	5.,24	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	LIGHTS HOLIDAYS
6	0., 9	53., 3	100., 2	53., 5	20., 2	0., 3	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	
7	0., 9	10., 3	20., 2	10., 1	0., 9	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	
21	100., 1	100.,99	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	

DAY NUMBER FOR JANUARY 1 IS 3 LEAP YEAR KEY IS 0

HOL												
	1/ 1, 0	3/ 4, 0	5/30, 0	7/ 4, 0	9/ 1, 0	10/13, 0	11/27, 0	12/25, 0	0/ 0, 0	0/ 0, 0	0/ 0, 0	0/ 0, 0

TABLE 11-24

DAY TYPE DESCRIPTION AND DISTRIBUTION

DT NO	PCT VARIATION PROFILE NUMBERS..... KEY PED	LTS	EJP	MSC	IPR	DPR	DFA	BEB	BFC	VOA	GA	TIME SCHEDULES OA	HS	CS	SB	UP	SDT SCH	FST SCH	J	F	M	A	M	J	J	A	S	O	N	D	S	M	T	W	T	F	S	H
1	1	3	1	0	6	1	1	3	0	0	0	4	6	4	1	0	1	0	*	*	*	*	*	*	*	*	*	*	*	*		*	*	*	*	*		
2	2	4	2	0	7	2	2	4	0	0	0	5	6	5	2	0	1	0	*	*	*	*	*	*	*	*	*	*	*	*							*	
3	0	5	0	0	0	0	0	5	0	0	0	3	6	3	3	0	1	0	*	*	*	*	*	*	*	*	*	*	*	*	*							*

SPECIAL HOURLY PRINTOUT

NO	DAY/DAY	NO	DAY/DAY	NO	DAY/DAY	NO	DAY/DAY	PRINT KEY
0	0 0	0	0 0	0	0 0	0	0 0	0

PERCENTAGE VARIATION PROFILES

NUMBER	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
1	0.	0.	0.	0.	0.	0.	1.	5.	90.	95.	100.	100.	75.	90.	100.	100.	95.	60.	40.	10.	5.	5.	5.	5.
2	0.	0.	0.	0.	0.	0.	1.	1.	5.	20.	20.	20.	15.	20.	15.	10.	5.	5.	5.	5.	5.	5.	5.	5.
3	5.	5.	5.	5.	5.	5.	40.	80.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	75.	75.	75.
4	5.	5.	5.	5.	5.	5.	5.	5.	20.	60.	60.	40.	30.	20.	15.	10.	5.	5.	5.	5.	5.	5.	5.	5.
5	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
6	0.	0.	0.	0.	0.	0.	0.	0.	0.	53.	53.	53.	100.	100.	53.	53.	53.	53.	53.	20.	20.	0.	0.	0.
7	0.	0.	0.	0.	0.	0.	0.	0.	0.	10.	10.	10.	20.	20.	10.	0.	0.	0.	0.	0.	0.	0.	0.	0.

SHUTOFF AND SETBACK TIME SCHEDULE 1

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
FEB	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
MAR	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
APR	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
MAY	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
JUN	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
JUL	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
AUG	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
SEP	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
OCT	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
NOV	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
DEC	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1

SHUTOFF AND SETBACK TIME SCHEDULE 2

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
FEB	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
MAR	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
APR	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
MAY	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
JUN	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
JUL	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
AUG	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
SEP	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
OCT	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
NOV	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
DEC	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1

TABLE 11-25

SHUTOFF AND SETBACK TIME SCHEDULE 3

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
FEB	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MAR	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
APR	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MAY	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
JUN	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
JUL	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
AUG	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SEP	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
OCT	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
NOV	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DEC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

SHUTOFF AND SETBACK TIME SCHEDULE 4

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
FEB	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
MAR	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
APR	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
MAY	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
JUN	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
JUL	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
AUG	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
SEP	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
OCT	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
NOV	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
DEC	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1

SHUTOFF AND SETBACK TIME SCHEDULE 5

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
FEB	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
MAR	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
APR	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
MAY	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
JUN	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
JUL	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
AUG	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
SEP	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
OCT	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
NOV	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
DEC	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1

TABLE 11-26

SHUTOFF AND SETBACK TIME SCHEDULE 6

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FEB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
APR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JUN	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
JUL	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
AUG	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SEP	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
OCT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NOV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

SHUTOFF AND SETBACK TIME SCHEDULE 7

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
FEB	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MAR	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
APR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JUN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JUL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AUG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SEP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OCT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NOV	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DEC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

SETBACK TEMPERATURE SCHEDULE 1

70	70	70	70	70	70	70	70	70	70	70	70

TABLE 11-27

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISHMAN-B 120 TONS 90 + 70 CLEVELAND COMPOSITE WEATHER TAPE VAV NO ECON 06/08/79

SYSTEM TYPE 8 STD. VARIABLE VOLUME

UNIT VALUES OF INPUT DATA (FLOOR AREA = 37800. SQFT)

	LATENT	SENSIBLE	
SOLAR LOAD		11.32	BTUH/SQFT
TRANSMISSION LOSS		0.238	BTUH/F-SQFT
TRANSMISSION GAIN		0.190	BTUH/F-SQFT
TOTAL INTERNAL LOAD	1.58	15.37	BTUH/SQFT
PEOPLE	1.58	2.02	BTUH/SQFT
LIGHTS		12.00	BTUH/SQFT
EQUIPMENT		0.56	BTUH/SQFT
MISCELLANEOUS	0.0	0.0	BTUH/SQFT
MINIMUM O/A, COOLING	4.20	1.73	BTUH/SQFT
OR ...		0.100	CFM/SQFT
OR ...		7.56	PCT OF TOTAL
PEAK COOLING LOAD	5.66	33.37	BTUH/SQFT
ROOM SENS ONLY		24.61	BTUH/SQFT
TOTAL		3.25	TONS/1000 SQFT
OR ...		307.44	SQFT/TON
COOLING CAPACITY		3.17	TONS/1000 SQFT
OR ...		315.00	SQFT/TON
ROOM SENS ONLY		27.14	BTUH/SQFT
MINIMUM O/A, HEATING	0.0	7.56	BTUH/SQFT
OR ...		0.100	CFM/SQFT
OR ...		7.56	PCT OF TOTAL
PEAK HEATING LOAD	0.0	24.20	BTUH/SQFT
HEATING CAPACITY		29.79	BTUH/SQFT
TOTAL PROCESS LOAD		1.22	BTUH/SQFT
INDIRECT		1.05	BTUH/SQFT
DIRECT		0.17	BTUH/SQFT
TOTAL BASE ELEC LOAD		4.96	WATTS/SQFT
SOURCE A		0.16	WATTS/SQFT
SOURCE B		3.75	WATTS/SQFT
SOURCE C		1.05	WATTS/SQFT
TOT PRIMARY AIRFLOW		1.323	CFM/SQFT
OR ...		416.7	CFM/TON

HEATING INSIDE = 72. / 0. OUTSIDE = 2. / -8.

COOLING INSIDE = 75. /55. OUTSIDE = 91. /73.

TABLE 11-28

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISHMAN-B 120 TONS 99 * 73 CLEVELAND COMPOSITE WEATHER TAPE VAV NO ECON 06/08/79

MONTHLY AND ANNUAL PEAK LOAD VALUES

	PEAK HEATING, MBH		PEAK COOLING, TONS		HUMIDFCN	INDIRECT PROCESS	DIRECT PROCESS	TOT BASE ELECTRIC
	RM LOSS	COILS	RM GAIN	COILS	MBH	MBH	MBH	KW
** JAN **	999.	1716.	41.6	93.0	0.	40.	6.	167.
DAY OF MONTH	29	28	2	2	0	2	2	2
TIME OF DAY	4AM	5AM	3PM	12 N		12 N	10AM	12 N
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	1	3	47	46	0	46	40	46
DEW POINT TEMP	-4	-4	38	37	0	37	33	37
** FEB **	893.	1662.	40.7	84.7	0.	40.	6.	170.
DAY OF MONTH	12	4	25	13	0	1	1	13
TIME OF DAY	3AM	5AM	4PM	11AM		12 N	10AM	11AM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	2	6	42	14	0	32	30	14
DEW POINT TEMP	-5	-1	27	2	0	26	26	2
** MAR **	786.	1235.	56.7	81.0	0.	38.	6.	169.
DAY OF MONTH	8	18	12	12	0	1	1	8
TIME OF DAY	1AM	5AM	11AM	4PM		12 N	10AM	10AM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	12	30	63	61	0	39	39	24
DEW POINT TEMP	5	26	43	40	0	34	33	15
** APR **	564.	1045.	64.0	120.0	0.	36.	6.	187.
DAY OF MONTH	4	8	29	22	0	1	1	22
TIME OF DAY	12 M	5AM	4PM	8AM		12 N	10AM	8AM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	31	34	75	68	0	59	59	68
DEW POINT TEMP	28	32	45	53	0	55	55	53
** MAY **	533.	340.	64.6	118.8	0.	35.	6.	174.
DAY OF MONTH	3	3	27	6	0	1	1	6
TIME OF DAY	4AM	4AM	10AM	7AM		12 N	10AM	8AM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	33	33	72	65	0	71	64	66
DEW POINT TEMP	29	29	44	44	0	33	32	44
** JUN **	355.	0.	76.1	120.0	0.	34.	6.	188.
DAY OF MONTH	2	0	26	10	0	3	3	17
TIME OF DAY	2AM		10AM	7AM		12 N	10AM	10AM
DAY TYPE	3	0	1	1	0	1	1	1
DRY BULB TEMP	47	0	91	66	0	75	75	85
DEW POINT TEMP	43	0	69	53	0	56	53	67

TABLE 11-29

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISHMAN-B 120 TONS 90 * 70 CLEVELAND COMPOSITE WEATHER TAPE VAV NO ECON 06/08/79

MONTHLY AND ANNUAL PEAK LOAD VALUES

	PEAK HEATING, MBH		PEAK COOLING, TONS		HUMIDFCN	INDIRECT PROCESS	DIRECT PROCESS	TOT BASE ELECTRIC
	RM LOSS	COILS	RM GAIN	COILS	MBH	MBH	MBH	KW
** JUL **	283.	0.	72.1	120.0	0.	32.	6.	188.
DAY OF MONTH	13	0	12	1	0	1	1	8
TIME OF DAY	4AM		5PM	5AM		12 N	10AM	10AM
DAY TYPE	1	0	1	1	0	1	1	1
DRY BULB TEMP	52	0	94	65	0	77	73	84
DEW POINT TEMP	52	0	62	57	0	57	55	67
** AUG **	368.	0.	72.9	120.0	0.	32.	6.	177.
DAY OF MONTH	24	0	27	5	0	1	1	5
TIME OF DAY	3AM		4PM	5AM		12 N	10AM	8AM
DAY TYPE	2	0	1	1	0	1	1	1
DRY BULB TEMP	45	0	90	64	0	77	73	72
DEW POINT TEMP	43	0	63	64	0	45	41	60
** SEP **	417.	0.	78.2	120.0	0.	34.	6.	181.
DAY OF MONTH	27	0	13	2	0	2	2	13
TIME OF DAY	2AM		4PM	5AM		12 N	10AM	4PM
DAY TYPE	1	0	[illegible]	1	0	1	1	1
DRY BULB TEMP	41	0	95	65	0	64	71	95
DEW POINT TEMP	40	0	62	64	0	63	63	62
** OCT **	504.	406.	65.3	100.2	0.	36.	6.	169.
DAY OF MONTH	25	25	4	4	0	1	1	4
TIME OF DAY	4AM	7AM	3PM	3PM		12 N	10AM	3PM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	34	33	82	82	0	65	63	82
DEW POINT TEMP	29	27	60	60	0	45	45	60
** NOV **	835.	1376.	50.6	92.1	0.	37.	6.	164.
DAY OF MONTH	29	28	1	11	0	1	1	11
TIME OF DAY	12 M	5AM	2PM	1PM		12 N	10AM	1PM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	8	16	65	49	0	62	54	49
DEW POINT TEMP	0	9	40	37	0	36	33	37
** DEC **	774.	1575.	40.9	78.2	0.	38.	6.	163.
DAY OF MONTH	21	16	4	17	0	2	2	17
TIME OF DAY	12 M	5AM	3PM	11AM		12 N	10AM	11AM
DAY TYPE	2	1	1	1	0	1	1	1
DRY BULB TEMP	13	11	50	27	0	37	36	27
DEW POINT TEMP	6	5	31	15	0	34	34	15
** ANN **	859.	1716.	78.2	120.0	0.	40.	6.	188.
MONTH OF YEAR	1	1	9	6	0	1	1	6
DAY OF MONTH	29	28	13	10	0	2	2	17
TIME OF DAY	4AM	5AM	4PM	7AM		12 N	10AM	10AM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	1	3	95	66	0	46	40	85
DEW POINT TEMP	-4	-4	62	53	0	37	33	67

TABLE 11-30

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISHMAN-B 120 TONS 90 + 70 CLEVELAND COMPOSITE WEATHER TAPE VAV NO ECON 06/08/79

MONTHLY AND ANNUAL LOADS

	HEATING MBTU	HEAT HOURS	COOLING TON-HRS	COOL HOURS	HUMIDFCN MBTU	IND PROC MBTU	DIR PROC MBTU	BS ELEC A KWH	BS ELEC B KWH	BS ELEC C KWH	TOT BS EL KWH	AUX F HRS
JAN	341741.	744	6787.	178	0.	5902.	1430.	1373.	55003.	1235.	57611.	0
FEB	269278.	672	7392.	182	0.	5377.	1304.	1252.	50083.	1259.	52594.	0
MAR	233019.	740	10301.	222	0.	5138.	1315.	1262.	50898.	2229.	54390.	0
APR	139655.	619	15648.	302	0.	5312.	1430.	1373.	54833.	2723.	58929.	0
MAY	87391.	583	18491.	335	0.	5194.	1430.	1373.	55003.	2987.	59363.	0
JUN	0.	0	25218.	319	0.	4597.	1315.	1262.	50728.	4899.	56889.	0
JUL	0.	0	30612.	340	0.	4721.	1430.	1373.	55003.	6471.	62847.	0
AUG	0.	0	26110.	346	0.	4747.	1441.	1383.	55308.	4443.	61134.	0
SEP	0.	0	19159.	309	0.	4793.	1367.	1312.	52628.	3623.	57563.	0
OCT	107930.	612	15227.	298	0.	5548.	1493.	1434.	57208.	3768.	62409.	0
NOV	233369.	706	7895.	203	0.	5030.	1315.	1262.	50728.	1502.	53492.	0
DEC	334567.	744	6229.	169	0.	5357.	1367.	1312.	52798.	1119.	55230.	0
ANN	1743648.	5420	189070.	3203	0.	61715.	16639.	15972.	640221.	36256.	692453.	0

TABLE 11-31

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISHMAN-B 120 TONS 93 + 70 CLEVELAND COMPOSITE WEATHER TAPE VAV NO ECON 06/08/79

	SO OR SB	MO/DY/TIME	NORM OPER	MO/DY/TIME
MIN ROOM TEMP	69.41 F	12/22/ 2AM	71.86 F	9/23/ 6AM
MAX ROOM TEMP	88.08 F	7/21/ 7PM	75.02 F	6/26/10AM
MAX ROOM HUMIDITY RATIO	87.22 GR	7/ 8/ 3PM		

COUNT OF HOURS ON LIMITING CONDITIONS	HEATING	COOLING
SPACE LOAD NOT MET (INCL PICKUP LOAD)	1	96
SPACE LOAD NOT MET (W/O PICKUP LOAD)	1	17
SYSTEM CAPACITY EXCEEDED	0	123
LONGEST PICKUP PERIOD	1	20
LAST HOUR OF OCCURRENCE	9/23/ 6AM	7/23/10AM

UNIT VALUES OF BUILDING ENERGY PEAKS AND CONSUMPTION

ANNUAL EQUIVALENT ENERGY CONSUMPTION = 170666. BTU/SQFT/YR

HEATING PEAK	45.40	BTUH/SQFT
HEATING CONSUMPTION	46.05	MBTU/SQFT
FULL LOAD HEATING	1014.	HRS
COOLING PEAK	3.17	TONS/1000 SQFT
OR	315.00	SQFT/TON
COOLING CONSUMPTION	5.00	TON-HRS/SQFT
FULL LOAD COOLING	1576.	HRS
PROCESS PEAK	1.22	BTUH/SQFT
PROCESS CONSUMPTION	2.37	MBTU/SQFT
INDIRECT	1.63	MBTU/SQFT
DIRECT	0.74	MBTU/SQFT
FULL LOAD PROCESS	1705.	HRS
ELECTRIC PEAK	4.96	WATTS/SQFT
ELECTRIC CONSUMPTION	18.32	KWH/SQFT
FULL LOAD ELECTRIC	3692.	HRS

PEAK HEATING LOAD DURING SETBACK = 330. MBH

MAX SUPPLY AIRFLOW IS 50000. CFM 3/ 1/ 5AM MIN SUPPLY AIRFLOW IS 5000. CFM 1/ 1/ 9AM

TABLE 11-32

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISHMAN-B 12C TONS 95 * 7C CLEVELAND COMPOSITE WEATHER TAPE VAV NO ECON 06/08/79

YEAR MO DT DA TIME DY CC DP	SOPAD RMIS	TRLOAD RMIL	BISHRC BISHRI	ZSHG IZSHG	OACFM DELHR	RTEMP RAT	AMAT DRRA	CDST RDST	TSA/ZVFC ZVFH	CCLOAD HCLOAD	CLT HLT	O-PROC I-PROC	HUMID DELEC
*** JAN ***													
554 1 1 3	0.	-601056.	-761292.	-832328.	3402.	72.0	24.2	56.0	5000.	0.	0	0.	0.
5AM 28 10 -4	14514.	114.	0.	-847684.	0.0	68.0	4.5	229.0	0.	1715963.	0	0.	7.
37 1 1 46	347036.	-258957.	0.	451316.	3780.	74.8	75.3	56.0	40127.	1116545.	0	4821.	0.
12 N 2 1 37	363237.	44913.	0.	823845.	10.15	77.9	38.6	56.0	0.	223607.	0	39536.	167.
*** FEB ***													
922 2 1 6	0.	-574069.	-761292.	-794305.	3402.	72.0	26.2	56.0	5000.	0.	0	0.	0.
5AM 4 4 -1	14514.	-1731.	0.	-832087.	0.0	68.1	5.4	226.1	0.	1662244.	0	0.	7.
1054 2 1 14	386761.	-546790.	0.	227527.	3780.	74.9	71.5	56.0	40904.	1016956.	0	6429.	0.
1148 13 2 2	387556.	59884.	0.	839794.	11.73	76.9	13.4	56.0	0.	511123.	0	20954.	170.
*** MAR ***													
1830 3 1 30	0.	-360388.	-761292.	-493245.	3402.	72.0	42.9	56.0	5000.	0.	0	0.	0.
5AM 18 10 26	14514.	1146.	0.	-710813.	0.0	69.0	20.1	203.6	0.	1235494.	0	0.	7.
1657 3 1 61	401453.	-125735.	0.	658410.	3780.	75.0	78.6	56.0	39740.	972392.	0	6107.	0.
4PM 12 1 40	362692.	56890.	0.	815393.	0.07	80.0	48.9	56.0	0.	88834.	0	19906.	168.
*** APR ***													
2534 4 1 34	0.	-324032.	-761292.	-309518.	3760.	72.0	42.9	56.0	5000.	0.	0	0.	0.
5AM 1 6 32	14514.	0.	0.	-556925.	0.0	69.1	26.6	175.1	0.	1045171.	0	0.	7.
2673 4 1 64	188417.	-75832.	812656.	490413.	3780.	75.5	83.4	56.7	50000.	1439998.	1	5786.	0.
8AM 22 6 53	377828.	53456.	86756.	1072952.	0.0	84.3	53.6	56.7	0.	0.	0	0.	187.
*** MAY ***													
2934 5 1 33	0.	-383547.	0.	-532920.	0.	75.9	0.0	0.0	0.	0.	0	0.	0.
5AM 3 0 29	14514.	-44496.	345878.	-255568.	0.0	75.1	42.0	0.0	0.	340410.	0	0.	7.
3000 5 1 65	145285.	-135183.	977940.	277189.	3780.	75.0	82.5	56.0	49856.	1425445.	0	321.	0.
7AM 6 7 44	237088.	2994.	0.	1023576.	0.0	83.5	39.8	56.0	0.	52894.	0	0.	153.
*** JUN ***													
0 0 0 0	0.	0.	0.	0.	0.	0.0	0.0	0.0	0.	0.	0	0.	0.
0 0 0	0.	0.	0.	0.	0.0	0.0	0.0	0.0	0.	0.	0	0.	0.
3448 6 1 66	204654.	-97876.	1095763.	373865.	3780.	75.1	82.7	56.0	50000.	1440000.	1	321.	0.
7AM 10 1 53	237588.	2994.	89614.	1115741.	0.00	83.6	60.9	56.0	0.	0.	0	0.	153.

TABLE 11-33

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLETSHMAN-H 120 TONS 90 * 70 CLEVELAND COMPOSITE WEATHER TAPE VAV NO ECON 06/08/79

YRHR MO DT DB TIME DY CC DP	SOLRAD RMIS	TRLOAD RMH	BHSHRC BHSHRI	ZSHG TZSHG	OACFM DELHR	RTEMP RAT	AMAT HRRA	COSF HDST	TSA/ZVFC ZVFH	CCLOAD HCLOAD	CLT HLT	D-PROC I-PROC	HUMID BELEC
*** JUL ***													
0 0 0 0	0.	0.	0.	0.	0.	0.0	0.0	0.0	0.	0.	0	0.	0.
0 0 0	0.	0.	0.	0.	0.0	0.0	0.0	0.0	0.	0.	0	0.	0.
4350 7 1 65	0.	-147484.	2438298.	-132892.	3780.	79.5	83.1	56.4	50000.	1440000.	1	0.	0.
5AM 1 0 57	14514.	0.	558586.	1562619.	1.21	84.2	63.2	56.4	0.	0.	0	0.	47.
*** AUG ***													
0 0 0 0	0.	0.	0.	0.	0.	0.0	0.0	0.0	0.	0.	0	0.	0.
0 0 0	0.	0.	0.	0.	0.0	0.0	0.0	0.0	0.	0.	0	0.	0.
5190 8 1 64	0.	-146885.	2032270.	-132291.	3780.	78.5	84.0	57.3	50000.	1440000.	1	0.	0.
5AM 5 10 64	14514.	0.	325461.	1281744.	2.54	85.2	64.4	57.3	0.	0.	0	0.	47.
*** SEP ***													
0 0 0 0	0.	0.	0.	0.	0.	0.0	0.0	0.0	0.	0.	0	0.	0.
0 0 0	0.	0.	0.	0.	0.0	0.0	0.0	0.0	0.	0.	0	0.	0.
5862 9 1 65	0.	-152303.	2645831.	-137789.	3780.	80.1	84.5	57.9	50000.	1440000.	1	0.	0.
5AM 2 10 64	14514.	0.	772726.	1699322.	3.22	85.7	65.1	57.9	0.	0.	0	0.	47.
*** OCT ***													
7136 10 1 33	0.	-368847.	0.	-131760.	3780.	74.3	43.8	56.0	5000.	0.	0	321.	0.
7AM 25 7 27	237088.	2954.	0.	281777.	0.0	75.6	22.8	56.0	0.	406486.	0	0.	114.
6640 10 1 82	350508.	45656.	0.	783760.	3780.	75.0	81.2	56.0	40698.	1202909.	0	6429.	0.
3PM 4 4 63	387556.	59884.	0.	935552.	3.38	80.7	64.1	56.0	0.	0.	0	18859.	169.
*** NOV ***													
7950 11 1 16	0.	-468027.	-640958.	-673079.	3402.	72.0	33.3	56.0	5000.	0.	0	0.	0.
5AM 28 10 9	14514.	-66843.	0.	-673724.	0.0	68.8	14.1	196.8	0.	1376038.	0	0.	7.
7550 11 1 49	272805.	-233160.	0.	417473.	3780.	75.0	75.6	56.0	37534.	1104637.	0	5786.	0.
1PM 11 6 37	377828.	53896.	0.	770611.	11.92	78.2	40.0	56.0	0.	196652.	0	36768.	164.
*** DEC ***													
8382 12 1 11	0.	-530841.	-761292.	-733601.	3402.	72.0	29.7	56.0	5000.	0.	0	0.	0.
5AM 16 10 5	14514.	196.	0.	-808855.	0.0	68.4	7.1	221.8	0.	1575163.	0	0.	7.
8412 12 1 27	286058.	-429624.	0.	244033.	3780.	74.8	72.2	56.0	36334.	938216.	0	6429.	0.
11AM 17 0 15	387556.	59884.	0.	745973.	12.02	77.0	19.7	56.0	0.	394319.	0	19906.	163.

TABLE 11-34

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISHMAN-B 120 TONS 90 + 70 CLEVELAND COMPOSITE WEATHER TAPE VAV ECON 06/08/79

SYS TP	FLOOR	SOLAR	PIP	PCIPL	PILT	PCILTR	PCLTRH	PIE	PIM	PCIML	PPI	PPD	PBEA	PBEB	PBEC	KY
8	37800.	427.8	136.1	44.	483.8	40.	0.	21.1	0.0	0.	39.5	6.4	6.	142.	40.	1

SOLAR AREA PERCENTAGES

D1	D2	D3	D4	D5	D6	D7	D8
19.	0.	33.	0.	18.	0.	30.	0.

TIME

H	SH	MO	HR	HSCAP	CSCAP
0.	0.	9	12	1126.	120.

SHUTOFF AND PRIMARY FUEL INTERRUPTION TEMPERATURES -- NO. OF DAYS

INTHST	INTCST	PFIT	HRS	JA	FE	MA	AP	MA	JU	JU	AU	SE	OC	NO	DE
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

HEATING LOADS

HIDB	HIDP	HDDB	HDDP	HDTL	TLHDU	HDSTU	TLHDL	HDSTL
72.	0.	2.	-8.	628.9	0.	0.	0.	0.

COOLING LOADS

CIDB	CIDP	CDDB	CDDP	CDTG	CDST	HRCD	SCDST	SHRCD
-75.	55.	91.	73.	115.0	56.	62.	0.	0.

RAIREM	RASOLM	SFDT	RFDT	HSF	KHSF
26.8	44.9	0.4	0.0	0.	0

AIRFLOW DATA

TSA	ZVFCM	ZVFHM	OAVMAX	OAMINC	OAMINH	OAMINS	TLEU	TLEL	TLCDU	CDTU	TLCDL	CDTL	CDTUO	VVMAF	EFFS	EFFL
50000.	0.	0.	50000.	3780.	3760.	3402.	-99.	-20.	0.	0.	0.	0.	0.	10.	0.	0.

ADDITIONAL SYSTEM DATA

RECR HEAT RATIO	NORMAL OPERATION..... MX TM	MX SUPL HT	MN TM	MN SUPL HT	SETBACK OPERATION..... MX TM	MX SUPL HT	MN TM	MN SUPL HT	EL KY	SY KY	PCT REDUCTION IN PEAK PROCESS..... J	F	M	A	M	J	J	A	S	O	N	D	PR KY	HUMID RS HI DP	HI AM	LO AM	HM KY	AR KY	INFIL CFM	IN KY
0.0	65	53.	-10	727.	65	53.	-10	727.	0	0	0.	0.	5.	10.	12.	15.	20.	20.	15.	10.	7.	5.	0	0	0	0	0	3	3402.	1

SHUTOFF AND SETBACK TIME SCHEDULES

NO	HR,DR	HR,DR	MO/MO	HR,DR	HR,DR	MO/MO	HR,DR	HR,DR	MO/MO	HR,DR	HR,DR	MO/MO	HR,DR	HR,DR	MO/MO	HR,DR	HR,DR	MO/MO
1	1, 5	20, 5	1/12	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0
2	1, 7	16, 9	1/12	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0
3	1,24	0, 0	1/12	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0
4	1, 7	20, 5	1/ 3	1, 5	20, 5	4/ 9	1, 7	20, 5	10/12	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0
5	1, 8	16, 9	1/ 3	1, 7	16, 9	4/ 9	1, 8	16, 9	10/12	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0
6	1,24	0, 0	6/ 9	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0
7	1,24	0, 0	1/ 3	1,24	0, 0	11/12	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0

SETBACK TEMPERATURE SCHEDULE

NO	TEMP	MO/MO	TEMP	MO/MO	TEMP	MO/MO	TEMP	MO/MO	TEMP	MO/MO	TEMP	MO/MO
1	70	1/12	0	0/ 0	0	0/ 0	0	0/ 0	0	0/ 0	0	0/ 0

PERCENTAGE VARIATION PROFILES

1	0., 0	1., 1	5., 1	90., 1	95., 1	100., 2	75., 1	90., 1	100., 2	95., 1	60., 1	40., 1	PEOPLE WEEKDAYS
1	10., 1	5., 5	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	
2	0., 0	1., 2	5., 1	20., 1	15., 1	20., 1	15., 1	10., 1	5., 8	0., 0	0., 0	0., 0	PEOPLE SATURDAY
3	5., 0	40., 1	80., 1	100.,13	75., 3	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	LIGHTS WEEKDAYS
4	5., 8	20., 1	60., 2	40., 1	30., 1	20., 1	15., 1	10., 1	5., 8	0., 0	0., 0	0., 0	LIGHTS SATURDAY
5	5.,24	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	LIGHTS HOLIDAYS
6	0., 1	91., 3	100., 2	93., 5	20., 2	0., 3	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	
7	0., 9	10., 3	20., 2	10., 1	0., 9	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	
21	100., 1	100.,99	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	

DAY SCHEDULE FOR JANUARY 1 IS 3 HOLIDAY SCHEDULE KEY IS 0

HOL 1/ 1, 1 2/ 2, 0 5/30, 0 7/ 4, 0 9/ 1, 1 10/13, 0 11/22, 0 12/25, 0 0/ 0, 0 0/ 0, 0 0/ 0, 0 0/ 0, 0

TABLE 11-35

DAY TYPE DESCRIPTION AND DISTRIBUTION

DT NO	PCT PEC	VARIATION PROFILE NUMBERS..... LTS	EOP	MSC	IPR	DPR	BEA	BEB	BEC	VOA	KEY OA	TIME SCHEDULES OA	HS	CS	SB	OP	SBT SCH	TST SCH	J	F	M	A	M	J	J	A	S	O	N	D	S	M	T	W	T	F	S	H
1	1	3	1	0	6	1	1	3	0	0	0	4	6	4	1	0	1	0	*	*	*	*	*	*	*	*	*	*	*	*		*	*	*	*	*		
2	2	4	2	0	7	2	2	4	0	0	0	5	6	5	2	0	1	0	*	*	*	*	*	*	*	*	*	*	*	*							*	
3	0	5	0	0	0	0	0	5	0	0	0	3	6	3	3	0	1	0	*	*	*	*	*	*	*	*	*	*	*	*	*							*

SPECIAL HOURLY PRINTOUT

MO	DAY/DAY		MO	DAY/DAY		MO	DAY/DAY		MO	DAY/DAY		PRINT KEY
0	0	0	0	0	0	0	0	0	0	0	0	0

PERCENTAGE VARIATION PROFILES

NUMBER	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
1	0.	0.	0.	0.	0.	0.	1.	5.	90.	95.	100.	100.	75.	90.	100.	100.	95.	60.	40.	10.	5.	5.	5.	5.
2	0.	0.	0.	0.	0.	0.	1.	1.	5.	20.	20.	20.	15.	20.	15.	10.	5.	5.	5.	5.	5.	5.	5.	5.
3	5.	5.	5.	5.	5.	5.	40.	80.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	75.	75.	75.
4	5.	5.	5.	5.	5.	5.	5.	5.	20.	60.	60.	40.	30.	20.	15.	10.	5.	5.	5.	5.	5.	5.	5.	5.
5	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
6	0.	0.	0.	0.	0.	0.	0.	0.	0.	53.	53.	53.	100.	100.	53.	53.	53.	53.	53.	20.	20.	0.	0.	0.
7	0.	0.	0.	0.	0.	0.	0.	0.	0.	10.	10.	10.	20.	20.	10.	0.	0.	0.	0.	0.	0.	0.	0.	0.

SHUTOFF AND SETBACK TIME SCHEDULE 1

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
FEB	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
MAR	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
APR	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
MAY	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
JUN	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
JUL	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
AUG	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
SEP	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
OCT	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
NOV	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
DEC	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1

SHUTOFF AND SETBACK TIME SCHEDULE 2

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
FEB	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
MAR	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
APR	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
MAY	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
JUN	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
JUL	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
AUG	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
SEP	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
OCT	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
NOV	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
DEC	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1

TABLE 11-36

SHUTOFF AND SETBACK TIME SCHEDULE 3

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
FEB	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MAR	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
APR	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MAY	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
JUN	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
JUL	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
AUG	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SEP	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
OCT	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
NOV	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DEC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

SHUTOFF AND SETBACK TIME SCHEDULE 4

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
FEB	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
MAR	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
APR	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
MAY	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
JUN	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
JUL	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
AUG	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
SEP	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
OCT	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
NOV	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
DEC	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1

SHUTOFF AND SETBACK TIME SCHEDULE 5

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
FEB	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
MAR	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
APR	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
MAY	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
JUN	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
JUL	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
AUG	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
SEP	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
OCT	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
NOV	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
DEC	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1

TABLE 11-37

SHUTOFF AND SETBACK TIME SCHEDULE 6

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FEB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
APR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JUN	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
JUL	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
AUG	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SEP	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
OCT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NOV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

SHUTOFF AND SETBACK TIME SCHEDULE 7

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
FEB	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MAR	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
APR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JUN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JUL	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AUG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SEP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OCT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NOV	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DEC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

SETBACK TEMPERATURE SCHEDULE 1

70	70	70	70	70	70	70	70	70	70	70	70

TABLE 11-38

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISHMAN-B 120 TONS 90 * 75 CLEVELAND COMPOSITE WEATHER TAPE VAV ECON 06/08/79

SYSTEM TYPE 8 STD. VARIABLE VOLUME

UNIT VALUES OF INPUT DATA (FLOOR AREA = 37800. SQFT)

	LATENT	SENSIBLE	
SOLAR LOAD		11.32	BTUH/SQFT
TRANSMISSION LOSS		0.238	BTUH/F-SQFT
TRANSMISSION GAIN		0.190	BTUH/F-SQFT
TOTAL INTERNAL LOAD	1.58	15.37	BTUH/SQFT
PEOPLE	1.58	2.02	BTUH/SQFT
LIGHTS		12.80	BTUH/SQFT
EQUIPMENT		0.56	BTUH/SQFT
MISCELLANEOUS	0.0	0.0	BTUH/SQFT
MINIMUM O/A, COOLING	4.20	1.73	BTUH/SQFT
OR ...		0.100	CFM/SQFT
OR ...		7.56	PCT OF TOTAL
PEAK COOLING LOAD	5.66	33.37	BTUH/SQFT
ROOM SENS ONLY		24.61	BTUH/SQFT
TOTAL		3.25	TONS/1000 SQFT
OR ...		307.44	SQFT/TON
COOLING CAPACITY		3.17	TONS/1000 SQFT
OR ...		315.00	SQFT/TON
ROOM SENS ONLY		27.14	BTUH/SQFT
MINIMUM O/A, HEATING	0.0	7.56	BTUH/SQFT
OR ...		0.100	CFM/SQFT
OR ...		7.56	PCT OF TOTAL
PEAK HEATING LOAD	0.0	24.20	BTUH/SQFT
HEATING CAPACITY		29.79	BTUH/SQFT
TOTAL PROCESS LOAD		1.22	BTUH/SQFT
INDIRECT		1.05	BTUH/SQFT
DIRECT		0.17	BTUH/SQFT
TOTAL BASE ELEC LOAD		4.96	WATTS/SQFT
SOURCE A		0.16	WATTS/SQFT
SOURCE B		3.75	WATTS/SQFT
SOURCE C		1.05	WATTS/SQFT
TOT PRIMARY AIRFLOW		1.323	CFM/SQFT
OR ...		416.7	CFM/TON

HEATING INSIDE = 72. / 0. OUTSIDE = 2. / -8.

COOLING INSIDE = 75. /55. OUTSIDE = 91. /73.

TABLE 11-39

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISCHMAN-B 120 TONS 95 * 75 CLEVELAND COMPOSITE WEATHER TAPE VAV ECON 06/08/79

MONTHLY AND ANNUAL PEAK LOAD VALUES

	PEAK HEATING, MBH		PEAK COOLING, TONS		HUMIDFCN	INDIRECT PROCESS	DIRECT PROCESS	TOT BASE ELECTRIC
	RM LOSS	COILS	RM GAIN	COILS	MBH	MBH	MBH	KW
** JAN **	899.	1716.	41.6	0.0	0.	40.	6.	167.
DAY OF MONTH	29	28	2	0	0	2	2	2
TIME OF DAY	4AM	5AM	3PM			12 N	10AM	12 N
DAY TYPE	1	1	1	0	0	1	1	1
DRY BULB TEMP	1	3	47	0	0	46	43	46
DEW POINT TEMP	-4	-4	38	0	0	37	33	37
** FEB **	893.	1662.	40.7	0.0	0.	40.	6.	170.
DAY OF MONTH	12	4	25	0	0	1	1	13
TIME OF DAY	3AM	5AM	4PM			12 N	10AM	11AM
DAY TYPE	1	1	1	0	0	1	1	1
DRY BULB TEMP	2	6	42	0	0	32	30	14
DEW POINT TEMP	-5	-1	27	0	0	26	26	2
** MAR **	786.	1235.	56.7	34.8	0.	38.	6.	169.
DAY OF MONTH	8	18	12	12	0	1	1	8
TIME OF DAY	1AM	5AM	11A	1PM		12 N	10AM	10AM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	12	30	60	67	0	39	39	24
DEW POINT TEMP	5	26	43	45	0	34	33	15
** APR **	564.	1045.	64.0	82.2	0.	36.	6.	187.
DAY OF MONTH	4	8	29	22	0	1	1	22
TIME OF DAY	12 M	5AM	4PM	12 N		12 N	10AM	8AM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	31	34	75	72	0	59	59	68
DEW POINT TEMP	28	32	45	60	0	55	55	53
** MAY **	533.	340.	64.6	99.0	0.	35.	6.	174.
DAY OF MONTH	3	3	27	31	0	1	1	6
TIME OF DAY	4AM	4AM	10AM	3PM		12 N	10AM	8AM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	33	33	72	82	0	71	64	66
DEW POINT TEMP	29	29	44	58	0	33	32	44
** JUN **	355.	0.	76.1	120.0	0.	34.	6.	188.
DAY OF MONTH	2	0	26	15	0	3	3	17
TIME OF DAY	2AM		10AM	7AM		12 N	10AM	10AM
DAY TYPE	3	0	1	2	0	1	1	1
DRY BULB TEMP	47	0	91	74	0	75	75	85
DEW POINT TEMP	43	0	69	71	0	56	53	67

TABLE 11-40

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

ELEISMAN-3 120 TONS [illegible] CLEVELAND COMPOSITE WEATHER TAPE VAV ECON 06/08/79

MONTHLY AND ANNUAL PEAK LOAD VALUES

	PEAK HEATING, MBH		PEAK COOLING, TONS		HUMIDFCN	INDIRECT PROCESS	DIRECT PROCESS	TOT BASE ELECTRIC
	RM LOSS	COILS	RM GAIN	COILS	MBH	MBH	MBH	KW
** JUL **	243.	0.	72.1	120.0	0.	32.	6.	188.
DAY OF MONTH	10	0	12	3	0	1	1	8
TIME OF DAY	4AM		5PM	5AM		12 N	10AM	10AM
DAY TYPE	1	0	1	1	0	1	1	1
DRY BULB TEMP	52	0	94	74	0	77	73	84
DEW POINT TEMP	52	0	62	70	0	57	55	67
** AUG **	368.	0.	72.9	116.9	0.	32.	6.	176.
DAY OF MONTH	24	0	27	27	0	1	1	27
TIME OF DAY	3AM		4PM	3PM		12 N	10AM	4PM
DAY TYPE	2	0	1	1	0	1	1	1
DRY BULB TEMP	45	0	90	91	0	77	73	90
DEW POINT TEMP	43	0	63	67	0	45	41	63
** SEP **	417.	0.	78.2	120.0	0.	34.	6.	181.
DAY OF MONTH	27	0	13	13	0	2	2	13
TIME OF DAY	2AM		4PM	4PM		12 N	10AM	4PM
DAY TYPE	1	0	1	1	0	1	1	1
DRY BULB TEMP	48	0	95	95	0	64	71	95
DEW POINT TEMP	40	0	62	62	0	63	63	62
** OCT **	504.	476.	65.3	100.2	0.	36.	6.	169.
DAY OF MONTH	25	25	4	4	0	1	1	4
TIME OF DAY	4AM	7AM	3PM	3PM		12 N	10AM	3PM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	34	33	82	82	0	65	63	82
DEW POINT TEMP	29	27	60	60	0	45	45	60
** NOV **	835.	1376.	50.6	59.6	0.	37.	6.	164.
DAY OF MONTH	29	28	1	13	0	1	1	11
TIME OF DAY	12 M	5AM	2PM	3PM		12 N	10AM	1PM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	8	16	65	69	0	62	54	49
DEW POINT TEMP	0	9	40	61	0	36	33	37
** DEC **	774.	1575.	40.9	9.3	0.	38.	6.	163.
DAY OF MONTH	21	16	4	24	0	2	2	17
TIME OF DAY	12 M	5AM	3PM	1 M		12 N	10AM	11AM
DAY TYPE	2	1	1	1	0	1	1	1
DRY BULB TEMP	13	11	50	59	0	37	36	27
DEW POINT TEMP	6	5	31	51	0	34	34	15
** ANN **	899.	1716.	78.2	120.0	0.	40.	6.	188.
MONTH OF YEAR	1	1	9	6	0	1	1	6
DAY OF MONTH	29	28	13	15	0	2	2	17
TIME OF DAY	4AM	5AM	4PM	7AM		12 N	10AM	10AM
DAY TYPE	1	1	1	2	0	1	1	1
DRY BULB TEMP	1	3	95	74	0	46	43	85
DEW POINT TEMP	-4	-4	62	71	0	37	33	67

TABLE 11-41

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISHMAN-6 120 TONS 90 + 70 CLEVELAND COMPOSITE WEATHER TAPE VAV ECON 06/08/79

MONTHLY AND ANNUAL LOADS

	HEATING MBTU	HEAT HOURS	COOLING TON-HRS	COOL HOURS	HUMIDFCN MBTU	IND PROC MBTU	DIR PROC MBTU	BS ELEC A KWH	BS ELEC B KWH	BS ELEC C KWH	TOT BS EL KWH	AUX F HRS
JAN	341741.	744	0.	0	0.	5902.	1430.	1373.	55003.	1235.	57611.	0
FEB	249278.	672	0.	0	0.	5377.	1304.	1252.	50083.	1259.	52594.	0
MAR	233019.	740	334.	35	0.	5138.	1315.	1262.	50898.	2229.	54390.	0
APR	159655.	619	3872.	130	0.	5312.	1430.	1373.	54833.	2722.	58928.	0
MAY	67091.	583	6721.	233	0.	5194.	1430.	1373.	55003.	2987.	59363.	0
JUN	0.	0	21989.	314	0.	4597.	1315.	1262.	50728.	4886.	56876.	0
JUL	0.	0	23843.	336	0.	4721.	1430.	1373.	55003.	6417.	62793.	0
AUG	0.	0	24120.	342	0.	4747.	1441.	1383.	55308.	4445.	61137.	0
SEP	0.	0	14010.	284	0.	4793.	1367.	1312.	52628.	3612.	57553.	0
OCT	107930.	612	5040.	159	0.	5548.	1493.	1434.	57208.	3768.	62409.	0
NOV	230369.	706	882.	41	0.	5030.	1315.	1262.	50728.	1502.	53492.	0
DEC	334567.	744	45.	13	0.	5357.	1367.	1312.	52798.	1119.	55230.	0
ANN	1743648.	5420	105004.	1887	0.	61715.	16639.	15972.	640221.	36180.	692376.	0

TABLE 11-42

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISHMAN-B 120 TONS 93 * 73 CLEVELAND COMPOSITE WEATHER TAPE VAV ECON 06/09/79

	SD OR SB	MO/DY/TIME	NORM OPER	MO/DY/TIME
MIN ROOM TEMP	69.81 F	12/22/ 2AM	71.86 F	9/23/ 6AM
MAX ROOM TEMP	88.04 F	7/21/ 7PM	75.09 F	7/ 5/ 3PM
MAX ROOM HUMIDITY RATIO	87.22 GR	7/ 4/ 3PM		

COUNT OF HOURS ON LIMITING CONDITIONS	HEATING	COOLING
SPACE LOAD NOT MET (INCL PICKUP LOAD)	1	87
SPACE LOAD NOT MET (W/O PICKUP LOAD)	1	17
SYSTEM CAPACITY EXCEEDED	0	98
LONGEST PICKUP PERIOD	1	18
LAST HOUR OF OCCURRENCE	9/23/ 6AM	7/23/ 8AM

UNIT VALUES OF BUILDING ENERGY PEAKS AND CONSUMPTION

HEATING PEAK	45.40	BTUH/SQFT
HEATING CONSUMPTION	46.05	MBTU/SQFT
FULL LOAD HEATING	1014.	HRS
COOLING PEAK	3.17	TONS/1000 SQFT
GR	315.00	SQFT/TON
COOLING CONSUMPTION	2.78	TON-HRS/SQFT
FULL LOAD COOLING	876.	HRS
PROCESS PEAK	1.22	BTUH/SQFT
PROCESS CONSUMPTION	2.27	MBTU/SQFT
INDIRECT	1.63	MBTU/SQFT
DIRECT	0.64	MBTU/SQFT
FULL LOAD PROCESS	1705.	HRS
ELECTRIC PEAK	4.96	WATTS/SQFT
ELECTRIC CONSUMPTION	18.32	KWH/SQFT
FULL LOAD ELECTRIC	3691.	HRS

ANNUAL EQUIVALENT ENERGY CONSUMPTION = 143972. BTU/SQFT/YR

PEAK HEATING LOAD DURING SETBACK = 330. MBH

MAX SUPPLY AIRFLOW IS 50300. CFM 3/ 1/ 5AM MIN SUPPLY AIRFLOW IS 5000. CFM 1/ 1/ 9AM

TABLE 11-43

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISHMAN-B 123 TONS 90 * 70 CLEVELAND COMPOSITE WEATHER TAPE VAV ECON 06/08/79

YRHR MO DT DB TIME DY CC DP	SOLRAD RMIS	ERLOAD RMIL	BHSHRC BHSHRI	ZSHG IZSHG	DALFM DELHR	RTEMP RAT	AMAT HARA	CDST HDST	TSA/ZVFC ZVFH	CCLOAD HCLOAD	CLT HLT	D-PROC I-PROC	HUMID BELEC
*** JAN ***													
654 1 1 3	0.	-601056.	-761292.	-832328.	3402.	72.0	24.2	56.0	5000.	0.	0	0.	0.
5A1 23 10 -4	14514.	114.	0.	-847684.	0.0	68.0	4.5	229.0	0.	1715963.	0	0.	7.
0 0 0. 0	0.	0.	0.	0.	0.	0.0	0.0	0.0	0.	0.	0	0.	0.
0 0 0	0.	0.	0.	0.	0.0	0.0	0.0	0.0	0.	0.	0	0.	0.
*** FEB ***													
422 2 1 6	0.	-574069.	-761292.	-794305.	3402.	72.0	26.2	56.0	5000.	0.	0	0.	0.
5A4 4 3E -1	14514.	-1731.	0.	-932087.	0.0	68.1	5.4	226.1	0.	1662244.	0	0.	7.
0 0 0. 0	0.	0.	0.	0.	0.	0.0	0.0	0.0	0.	0.	0	0.	0.
0 0 0 0	0.	0.	0.	0.	0.0	0.0	0.0	0.0	0.	0.	0	0.	0.
*** MAR ***													
1830 3 1 30	0.	-363388.	-761292.	-493245.	3402.	72.0	42.9	56.0	5000.	0.	0	0.	0.
5A4 18 13 26	14514.	1395.	0.	-710813.	0.0	69.0	20.1	203.6	0.	1235494.	0	0.	7.
1094 3 1 67	327163.	-71034.	0.	633184.	34001.	75.0	67.4	56.0	34001.	417881.	0	5786.	0.
1P4 12 3 45	377828.	53056.	0.	698061.	0.0	79.6	46.8	56.0	0.	0.	0	37559.	160.
*** APR ***													
2354 4 1 34	0.	-324032.	-761292.	-309518.	3780.	72.0	42.9	56.0	5000.	0.	0	0.	0.
5A4 8 6 32	14514.	0.	0.	-556925.	0.0	69.1	26.6	175.1	0.	1045171.	0	0.	7.
2677 4 1 72	283621.	-26948.	0.	619909.	3780.	75.0	79.1	56.0	35292.	985822.	0	4821.	0.
12 N 22 6 60	363237.	44913.	0.	724570.	4.28	79.5	63.9	56.0	0.	0.	0	35582.	160.
*** MAY ***													
2933 5 1 33	0.	-388547.	0.	-532920.	0.	75.9	0.0	0.0	0.	0.	0	0.	0.
4A4 3 2 29	14514.	-178.	345878.	-255968.	0.0	75.1	23.2	0.0	0.	340410.	0	0.	7.
3616 5 1 82	303140.	50326.	0.	741022.	3780.	75.0	81.6	56.0	39986.	1187515.	0	6429.	0.
3P4 31 3 58	387556.	59884.	0.	820936.	3.01	81.1	64.2	56.0	0.	0.	0	18440.	168.
*** JUN ***													
0 0 0 0	0.	0.	0.	0.	0.	0.0	0.0	0.0	0.	0.	0	0.	0.
0 0 0	0.	0.	0.	0.	0.0	0.0	0.0	0.0	0.	0.	0	0.	0.
3968 6 2 74	209686.	-39306.	1284546.	185867.	3780.	77.0	81.5	56.0	50000.	1440000.	1	64.	0.
7A4 15 0 71	15487.	595.	60720.	1086760.	4.80	81.7	66.8	56.0	0.	0.	0	0.	47.

TABLE 11-44

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISHMAN-B 120 TONS 90 * 70 CLEVELAND COMPOSITE WEATHER TAPE VAV ECON 06/08/79

YRCR MO DT DB TIME DY CC DP	SOLRAD RMIS	TRELOAD RMIL	BHSHRC BHSHRI	ZSHG TZSHG	DACFM DELHR	RTEMP RAT	AMAT HRRA	CDST HDST	TSA/ZVFC ZVFH	CCLOAD HCLOAD	CLT HLT	D-PROC E-PROC	HUMID BELEC
*** JUL ***													
0 0 0 0	0.	0.	0.	0.	0.	0.0	0.0	0.0	0.	0.	0	0.	0.
0 0 0	0.	0.	0.	0.	0.0	0.0	0.0	0.0	0.	0.	0	0.	0.
4398 7 1 74	0.	-42749.	1430401.	-28235.	3780.	75.0	83.3	56.1	49014.	1440000.	0	0.	0.
5AM 3 9 70	14514.	0.	0.	973299.	4.48	83.6	66.2	56.1	0.	0.	0	0.	44.
*** AUG ***													
0 0 0 0	0.	0.	0.	0.	0.	0.0	0.0	0.0	0.	0.	0	0.	0.
0 0 0	0.	0.	0.	0.	0.0	0.0	0.0	0.0	0.	0.	0	0.	0.
5728 8 1 91	353149.	110078.	0.	856713.	3780.	74.9	82.5	56.0	43778.	1403246.	0	6429.	0.
3PM 27 0 67	387556.	59884.	0.	898795.	5.02	81.2	64.0	56.0	0.	0.	0	16763.	175.
*** SEP ***													
0 0 0 0	0.	0.	0.	0.	0.	0.0	0.0	0.0	0.	0.	0	0.	0.
0 0 0	0.	0.	0.	0.	0.0	0.0	0.0	0.0	0.	0.	0	0.	0.
6137 9 1 95	411325.	144553.	0.	938570.	3780.	74.9	82.5	56.0	47171.	1440000.	0	6107.	0.
4PM 13 0 62	382692.	56890.	0.	968459.	3.45	81.0	68.5	56.0	0.	0.	0	17811.	181.
*** OCT ***													
7126 10 1 33	0.	-368847.	0.	-131760.	3780.	74.3	43.8	56.0	5000.	0.	0	321.	0.
7AM 25 7 27	237088.	2994.	0.	281777.	0.0	75.6	22.5	56.0	0.	406486.	0	0.	114.
6640 10 1 82	350508.	45696.	0.	783760.	3780.	75.0	81.2	56.0	40698.	1202939.	0	6429.	0.
3PM 4 4 60	387556.	59884.	0.	835552.	3.38	80.7	64.1	56.0	0.	0.	0	18859.	169.
*** NOV ***													
7550 11 1 16	0.	-438327.	-640958.	-673079.	3402.	72.0	33.3	56.0	5000.	0.	0	0.	0.
5AM 28 10 9	14514.	-38016.	0.	-673724.	0.0	68.8	11.8	196.8	0.	1376038.	0	0.	7.
7633 11 1 69	119259.	-58375.	0.	448740.	26359.	75.0	69.4	56.0	26359.	715155.	0	6429.	0.
5PM 13 10 61	387556.	59884.	0.	541171.	18.33	79.1	65.3	56.0	0.	0.	0	19487.	154.
*** DEC ***													
8302 12 1 11	0.	-530841.	-761292.	-733401.	3402.	72.0	29.7	56.0	5000.	0.	0	0.	0.
5AM 16 10 5	14514.	196.	0.	-808855.	0.0	68.4	7.1	221.8	0.	1575163.	0	0.	7.
8532 12 1 59	212895.	-141779.	0.	443945.	30648.	74.8	59.4	56.0	30648.	111876.	0	5786.	0.
1PM 29 8 51	377828.	53856.	0.	629219.	0.0	78.1	58.3	56.0	0.	106803.	0	37559.	156.

TABLE 11-45

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

TELESHOW-B 120 TONS 55 *70 CLEVELAND COMPOSITE WEATHER TAPE CALIF HP 06/08/79

SYS TP	FLOOR	SGLAR	PIP	PCIPL	PILT	PCILTR	PCLTRH	PIE	PIM	PCIML	PPI	PPO	PBEA	PBEB	PBEC	KY
8	37800.	527.8	136.1	44.	483.8	40.	0.	21.1	0.0	0.	39.5	6.4	6.	142.	0.	0

SOLAR AREA PERCENTAGES

D1	D2	D3	D4	D5	D6	D7	D8	H
19.	0.	45.	0.	18.	0.	30.	0.	0.

TIME

SH	MO	HR	HSCAP	CSCAP
0.	9	12	1126.	120.

SHUTOFF AND PRIMARY FUEL INTERRUPTION TEMPERATURES -- NO. OF DAYS

INTHST	INTCST	PFIT	HRS	JA	FE	MA	AP	MA	JU	JU	AU	SE	OC	NO	DE
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

HEATING LOADS

HIDB	HIDP	HDDB	HDDP	HDTL	TLHDU	HDSTU	TLHDL	HDSTL
72.	0.	2.	-6.	628.9	0.	0.	0.	0.

COOLING LOADS

CIDB	CIDP	CDDB	CDDP	CDTG	CDST	HRCD	SCDST	SHRCD
-75.	55.	91.	73.	115.0	56.	62.	0.	0.

RATKEM	RASOLM	SFDT	RFDT	HSF	KHSF
26.8	44.9	0.0	0.0	0.	0

AIRFLOW DATA

TSA	ZVFCM	ZVFHM	DAVMAX	DAMINC	DAMINH	DAMINS	TLEU	TLEL	TLCDU	CDTU	TLCDL	CDTL	CDTUO	VVMAF	EFFS	EFFL
55.0F.	0.	0.	3780.	3780.	3780.	3402.	0.	0.	0.	0.	0.	0.	0.	10.	0.	0.

ADDITIONAL SYSTEM DATA

WEEK HEAT PATD	NORMAL OPERATION..... MX TM	SUPL	HT	MN TM	SUPL	HT	SETBACK OPERATION..... MX TM	SUPL	HT	MN TM	SUPL	HT	EL KY	SY KY	PCT REDUCTION IN PEAK PROCESS..... J	F	M	A	M	J	J	A	S	O	N	D	PR KY	HUMID RS HI DP	HI AM	LO AM	HM KY	AR KY	INFIL CFM	IN KY
0.0	65		53.	-10		727.	65		53.	-10		727.	0	0	0.	0.	5.	10.	12.	15.	20.	20.	15.	10.	7.	5.	0	0	0	0	0	3	3402.	1

SHUTOFF AND SETBACK TIME SCHEDULES

NO	HR,DR	HR,DR	MO/MO	HR,DR	HR,DR	MO/MO	HR,DR	HR,DR	MO/MO	HR,DR	HR,DR	MO/MO	HR,DR	HR,DR	MO/MO	HR,DR	HR,DR	MO/MO	HR,DR	HR,DR	MO/MO
1	1, 5	20, 5	1/12	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0
2	1, 7	16, 9	1/12	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0
3	1,24	0, 0	1/12	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0
4	1, 7	20, 5	1/ 3	1, 5	20, 5	4/ 9	1, 7	20, 5	10/12	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0
5	1, 8	16, 9	1/ 3	1, 7	16, 9	4/ 9	1, 8	16, 9	10/12	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0
6	1,24	0, 0	6/ 9	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0
7	1,24	0, 0	1/ 3	1,24	0, 0	11/12	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0

SETBACK TEMPERATURE SCHEDULE

NO	TEMP	MO/MO	TEMP	MO/MO	TEMP	MO/MO	TEMP	MO/MO	TEMP	MO/MO	TEMP	MO/MO
1	70	1/12	0	0/ 0	0	0/ 0	0	0/ 0	0	0/ 0	0	0/ 0

PERCENTAGE VARIATION PROFILES

1	0., 6	1., 1	5., 1	90., 1	95., 1	100., 2	75., 1	90., 1	100., 2	95., 1	60., 1	40., 1	PEOPLE WEEKDAYS
1	10., 1	5., 4	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	
2	0., 6	1., 2	5., 1	20., 3	15., 1	20., 1	15., 1	10., 1	5., 8	0., 0	0., 0	0., 0	PEOPLE SATURDAY
3	5., 6	40., 1	80., 1	100.,13	75., 3	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	LIGHTS WEEKDAYS
4	5., 8	20., 1	60., 2	40., 1	30., 1	20., 1	15., 1	10., 1	5., 8	0., 0	0., 0	0., 0	LIGHTS SATURDAY
5	5.,24	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	LIGHTS HOLIDAYS
6	0., 9	53., 3	100., 2	53., 5	20., 2	0., 3	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	
7	0., 9	10., 3	20., 2	10., 1	0., 9	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	
21	130., 1	100.,99	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	

DAY NUMBER FOR JANUARY 1 IS 3 LEAP YEAR KEY IS 0

JOB	1/ 1, 0	3/ 4, 0	5/30, 0	7/ 4, 0	9/ 1, 0	10/13, 0	11/27, 0	12/25, 0	0/ 0, 0	0/ 0, 0	0/ 0, 0	0/ 0, 0

TABLE 11-46

DAY TYPE DESCRIPTION AND DISTRIBUTION

DT NO	PCT PID	VARIATION PROFILE NUMBERS..... KEY LTS	EQP	MSC	IPR	DPR	BEA	BEB	BEC	VUA	UA	TIME SCHEDULES GA	HS	CS	SB	UP	SRT SCH	TST SCH	J	F	M	A	M	J	J	A	S	O	N	D	S	M	T	W	T	F	S	H
1	1	3	1	0	6	1	1	3	0	0	0	4	6	4	1	0	1	0	*	*	*	*	*	*	*	*	*	*	*	*		*	*	*	*	*		
2	2	4	2	0	7	2	2	4	0	0	0	5	6	5	2	0	1	0	*	*	*	*	*	*	*	*	*	*	*	*							*	
3	0	5	0	0	0	0	0	5	0	0	0	3	6	3	3	0	1	0	*	*	*	*	*	*	*	*	*	*	*	*	*							*

SPECIAL HOURLY PRINTOUT

MO	DAY/DAY	MO	DAY/DAY	MO	DAY/DAY	MO	DAY/DAY	PRINT KEY
0	0 0	0	0 0	0	0 0	0	0 0	0

PERCENTAGE VARIATION PROFILES

NUMBER	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
1	0.	0.	0.	0.	0.	0.	1.	5.	90.	95.	100.	100.	75.	90.	100.	100.	95.	60.	40.	10.	5.	5.	5.	5.
2	0.	0.	0.	0.	0.	0.	1.	1.	5.	20.	20.	20.	15.	20.	15.	10.	5.	5.	5.	5.	5.	5.	5.	5.
3	5.	5.	5.	5.	5.	5.	60.	80.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	75.	75.	75.
4	5.	5.	5.	5.	5.	5.	5.	5.	20.	60.	60.	40.	30.	20.	15.	10.	5.	5.	5.	5.	5.	5.	5.	5.
5	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
6	0.	0.	0.	0.	0.	0.	0.	0.	0.	53.	53.	53.	100.	100.	53.	53.	53.	53.	53.	20.	20.	0.	0.	0.
7	0.	0.	0.	0.	0.	0.	0.	0.	0.	10.	10.	10.	20.	20.	10.	0.	0.	0.	0.	0.	0.	0.	0.	0.

SHUTOFF AND SETBACK TIME SCHEDULE 1

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
FEB	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
MAR	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
APR	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
MAY	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
JUN	1	1	1	1	1	0	0	0		0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
JUL	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
AUG	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
SEP	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
OCT	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
NOV	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
DEC	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1

SHUTOFF AND SETBACK TIME SCHEDULE 2

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
FEB	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
MAR	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
APR	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
MAY	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
JUN	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
JUL	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
AUG	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
SEP	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
OCT	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
NOV	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
DEC	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1

TABLE 11-47

SHUTOFF AND SETBACK TIME SCHEDULE 3

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
FEB	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MAR	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
APR	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MAY	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
JUN	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
JUL	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
AUG	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SEP	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
OCT	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
NOV	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DEC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

SHUTOFF AND SETBACK TIME SCHEDULE 4

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
FEB	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
MAR	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
APR	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
MAY	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
JUN	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
JUL	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
AUG	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
SEP	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
OCT	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
NOV	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
DEC	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1

SHUTOFF AND SETBACK TIME SCHEDULE 5

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
FEB	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
MAR	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
APR	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
MAY	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
JUN	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
JUL	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
AUG	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
SEP	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
OCT	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
NOV	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
DEC	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1

TABLE 11-48

SHUTOFF AND SETBACK TIME SCHEDULE 6

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FEB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
APR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JUN	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
JUL	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
AUG	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SEP	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
OCT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NOV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

SHUTOFF AND SETBACK TIME SCHEDULE 7

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
FEB	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MAR	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
APR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JUN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JUL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AUG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SEP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OCT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NOV	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DEC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

SETBACK TEMPERATURE SCHEDULE 1

70	70	70	70	70	70	70	70	70	70	70	70

TABLE 11-49

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISHMAN-B 120 TONS 90 470 CLEVELAND COMPOSITE WEATHER TAPE CALIF HP 06/08/79

SYSTEM TYPE 8 STD. VARIABLE VOLUME

UNIT VALUES OF INPUT DATA (FLOOR AREA = 37800. SQFT)

	LATENT	SENSIBLE	
SOLAR LOAD		11.32	BTUH/SQFT
TRANSMISSION LOSS		0.238	BTUH/F-SQFT
TRANSMISSION GAIN		0.190	BTUH/F-SQFT
TOTAL INTERNAL LOAD	1.58	15.37	BTUH/SQFT
PEOPLE	1.58	2.02	BTUH/SQFT
LIGHTS		12.80	BTUH/SQFT
EQUIPMENT		0.56	BTUH/SQFT
MISCELLANEOUS	0.0	0.0	BTUH/SQFT
MINIMUM O/A, COOLING	4.20	1.73	BTUH/SQFT
OR ...		0.100	CFM/SQFT
OR ...		7.56	PCT OF TOTAL
PEAK COOLING LOAD	5.66	32.83	BTUH/SQFT
ROOM SENS ONLY		24.61	BTUH/SQFT
TOTAL		3.21	TONS/1000 SQFT
OR		311.78	SQFT/TON
COOLING CAPACITY		3.17	TONS/1000 SQFT
OR ...		315.00	SQFT/TON
ROOM SENS ONLY		27.14	BTUH/SQFT
MINIMUM O/A, HEATING	0.0	7.56	BTUH/SQFT
OR ...		0.100	CFM/SQFT
OR ...		7.56	PCT OF TOTAL
PEAK HEATING LOAD	0.0	24.20	BTUH/SQFT
HEATING CAPACITY		25.79	BTUH/SQFT
TOTAL PROCESS LOAD		1.22	BTUH/SQFT
INDIRECT		1.05	BTUH/SQFT
DIRECT		0.17	BTUH/SQFT
TOTAL BASE ELEC LOAD		3.91	WATTS/SQFT
SOURCE A		0.16	WATTS/SQFT
SOURCE B		3.75	WATTS/SQFT
SOURCE C		0.0	WATTS/SQFT
TOT PRIMARY AIRFLOW		1.323	CFM/SQFT
OR ...		416.7	CFM/TON

HEATING INSIDE = 72. / 0. OUTSIDE = 2. / -8.

COOLING INSIDE = 75. /55. OUTSIDE = 91. /73.

TABLE 11-50

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLETCHER-B 120 TONS 90 470 CLEVELAND COMPOSITE WEATHER TAPE CALIF HP 06/08/79

MONTHLY AND ANNUAL PEAK LOAD VALUES

	PEAK HEATING, MBH		PEAK COOLING, TONS		HUMIDFCN	INDIRECT PROCESS	DIRECT PROCESS	TOT BASE ELECTRIC
	RM LOSS	COILS	RM GAIN	COILS	MBH	MBH	MBH	KW
** JAN **	899.	1718.	41.6	91.7	0.	40.	6.	148.
DAY OF MONTH	29	28	2	2	0	2	2	2
TIME OF DAY	4AM	5AM	3PM	12 N		12 N	10AM	10AM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	1	3	47	46	0	46	40	40
DEW POINT TEMP	-4	-4	38	37	0	37	33	33
** FEB **	893.	1664.	40.7	83.3	0.	40.	6.	148.
DAY OF MONTH	12	4	25	13	0	1	1	1
TIME OF DAY	3AM	5AM	4PM	11AM		12 N	10AM	10AM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	2	6	42	14	0	32	30	30
DEW POINT TEMP	-5	-1	27	2	0	26	26	26
** MAR **	786.	1239.	56.7	79.7	0.	38.	6.	148.
DAY OF MONTH	8	18	12	12	0	1	1	1
TIME OF DAY	1AM	5AM	11AM	4PM		12 N	10AM	10AM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	12	30	60	61	0	39	39	39
DEW POINT TEMP	5	26	43	40	0	36	33	33
** APR **	564.	1047.	64.0	120.0	0.	36.	6.	148.
DAY OF MONTH	4	8	29	22	0	1	1	1
TIME OF DAY	12 M	5AM	4PM	8AM		12 N	10AM	10AM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	31	34	75	68	0	59	59	59
DEW POINT TEMP	28	32	45	53	0	55	55	55
** MAY **	533.	340.	64.6	117.1	0.	35.	6.	148.
DAY OF MONTH	3	3	27	6	0	1	1	1
TIME OF DAY	4AM	4AM	10AM	7AM		12 N	10AM	10AM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	33	33	72	65	0	71	64	64
DEW POINT TEMP	29	29	44	44	0	33	32	32
** JUN **	355.	0.	76.1	120.0	0.	34.	6.	148.
DAY OF MONTH	2	0	26	15	0	3	3	3
TIME OF DAY	2AM		10AM	7AM		12 N	10AM	10AM
DAY TYPE	3	0	1	2	0	1	1	1
DRY BULB TEMP	47	0	91	74	0	75	75	75
DEW POINT TEMP	43	0	69	71	0	56	53	53

TABLE 11-51

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISHMAN-B 120 TONS 60 *70 CLEVELAND COMPOSITE WEATHER TAPE CALIF HP 06/08/79

MONTHLY AND ANNUAL PEAK LOAD VALUES

	PEAK HEATING, MBH		PEAK COOLING, TONS		HUMIDFCN	INDIRECT PROCESS	DIRECT PROCESS	TOT BASE ELECTRIC
	RM LOSS	COILS	RM GAIN	COILS	MBH	MBH	MBH	KW
** JUL **	283.	0.	72.1	120.0	0.	32.	6.	148.
DAY OF MONTH	10	0	12	1	0	1	1	1
TIME OF DAY	4AM		5PM	5AM		12 N	10AM	10AM
DAY TYPE	1	0	1	1	0	1	1	1
DRY BULB TEMP	52	0	94	65	0	77	73	73
DEW POINT TEMP	52	0	62	57	0	57	55	55
** AUG **	368.	0.	72.9	120.0	0.	32.	6.	148.
DAY OF MONTH	24	0	27	5	0	1	1	1
TIME OF DAY	3AM		4PM	5AM		12 N	10AM	10AM
DAY TYPE	2	0	1	1	0	1	1	1
DRY BULB TEMP	45	0	90	64	0	77	73	73
DEW POINT TEMP	43	0	63	64	0	45	41	41
** SEP **	417.	0.	78.2	120.0	0.	34.	6.	148.
DAY OF MONTH	27	0	13	2	0	2	2	2
TIME OF DAY	2AM		4PM	5AM		12 N	10AM	10AM
DAY TYPE	1	0	1	1	0	1	1	1
DRY BULB TEMP	41	0	95	65	0	64	71	71
DEW POINT TEMP	40	0	62	64	0	63	63	63
** OCT **	504.	439.	65.3	98.8	0.	36.	6.	148.
DAY OF MONTH	25	25	4	4	0	1	1	1
TIME OF DAY	4AM	7AM	3PM	3PM		12 N	10AM	10AM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	34	33	82	82	0	65	63	63
DEW POINT TEMP	29	27	60	60	0	45	45	45
** NOV **	835.	1378.	50.6	90.8	0.	37.	6.	148.
DAY OF MONTH	29	28	1	11	0	1	1	1
TIME OF DAY	12 M	5AM	2PM	1PM		12 N	10AM	10AM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	8	16	65	49	0	62	54	54
DEW POINT TEMP	0	9	40	37	0	36	33	33
** DEC **	774.	1577.	40.9	76.9	0.	38.	6.	148.
DAY OF MONTH	21	16	4	17	0	2	2	2
TIME OF DAY	12 M	5AM	3PM	11AM		12 N	10AM	10AM
DAY TYPE	2	1	1	1	0	1	1	1
DRY BULB TEMP	13	11	59	27	0	37	36	36
DEW POINT TEMP	6	5	31	15	0	34	34	34
** ANN **	899.	1718.	78.2	120.0	0.	40.	6.	148.
MONTH OF YEAR	1	1	9	6	0	1	1	1
DAY OF MONTH	29	28	13	15	0	2	2	2
TIME OF DAY	4AM	5AM	4PM	7AM		12 N	10AM	10AM
DAY TYPE	1	1	1	2	0	1	1	1
DRY BULB TEMP	1	3	95	74	0	46	40	40
DEW POINT TEMP	-6	-4	62	71	0	37	33	33

TABLE 11-52

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISCHAN-B 120 TONS 90 475 CLEVELAND COMPOSITE WEATHER TAPE CALIF HP 06/08/79

MONTHLY AND ANNUAL LOADS

	HEATING MBTU	HEAT HOURS	COOLING TON-HRS	COOL HOURS	HUMIDFCN MBTU	IND PROC MBTU	DIR PROC MBTU	BS ELEC A KWH	BS ELEC B KWH	BS ELEC C KWH	TOT BS EL KWH	AUX F HRS
JAN	342223.	744	6624.	178	0.	5902.	1430.	1373.	55003.	0.	56376.	0
FEB	269653.	672	7223.	182	0.	5377.	1304.	1252.	50083.	0.	51335.	0
MAR	230297.	740	10060.	222	0.	5136.	1315.	1262.	50898.	0.	52160.	0
APR	139735.	619	15353.	332	0.	5312.	1430.	1373.	54833.	0.	56206.	0
MAY	87172.	583	18167.	335	0.	5194.	1430.	1373.	55003.	0.	56376.	0
JUN	0.	0	24499.	319	0.	4597.	1315.	1262.	50728.	0.	51990.	0
JUL	0.	0	30232.	340	0.	4721.	1430.	1373.	55003.	0.	56376.	0
AUG	0.	0	25731.	346	0.	4747.	1441.	1383.	55308.	0.	56691.	0
SEP	0.	0	18870.	306	0.	4793.	1367.	1312.	52628.	0.	53941.	0
OCT	107999.	612	14917.	297	0.	5548.	1493.	1434.	57208.	0.	58642.	0
NOV	230637.	706	7721.	203	0.	5030.	1315.	1262.	50728.	0.	51990.	0
DEC	335056.	744	6060.	168	0.	5357.	1367.	1312.	52798.	0.	54111.	0
ANN	1742569.	5420	185935.	3198	0.	61715.	16639.	15972.	640221.	0.	656195.	0

TABLE 11-53

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISHMAN-B 120 TONS 90 +70 CLEVELAND COMPOSITE WEATHER TAPE CALIF HP 06/08/79

	SD OR SB	MO/DY/TIME	NORM OPER	MO/DY/TIME
MIN ROOM TEMP	69.81 F	12/22/ 2AM	71.85 F	9/23/ 6AM
MAX ROOM TEMP	88.08 F	7/21/ 7PM	75.01 F	1/ 3/ 9AM
MAX ROOM HUMIDITY RATIO	86.96 GR	7/22/ 5PM		

COUNT OF HOURS ON LIMITING CONDITIONS	HEATING	COOLING
SPACE LOAD NOT MET (INCL PICKUP LOAD)	1	90
SPACE LOAD NOT MET (W/O PICKUP LOAD)	1	17
SYSTEM CAPACITY EXCEEDED	0	107
LONGEST PICKUP PERIOD	1	18
LAST HOUR OF OCCURRENCE	9/23/ 6AM	7/23/ 8AM

UNIT VALUES OF BUILDING ENERGY PEAKS AND CONSUMPTION

ANNUAL EQUIVALENT ENERGY CONSUMPTION = 166439. BTU/SQFT/YR

HEATING PEAK	45.45	BTUH/SQFT
HEATING CONSUMPTION	46.10	MBTU/SQFT
FULL LOAD HEATING	1014.	HRS
COOLING PEAK	3.17	TONS/1000 SQFT
OR	315.00	SQFT/TON
COOLING CONSUMPTION	4.92	TON-HRS/SQFT
FULL LOAD COOLING	1549.	HRS
PROCESS PEAK	1.22	BTUH/SQFT
PROCESS CONSUMPTION	2.07	MBTU/SQFT
INDIRECT	1.63	MBTU/SQFT
DIRECT	0.44	MBTU/SQFT
FULL LOAD PROCESS	1705.	HRS
ELECTRIC PEAK	3.91	WATTS/SQFT
ELECTRIC CONSUMPTION	17.36	KWH/SQFT
FULL LOAD ELECTRIC	4435.	HRS

PEAK HEATING LOAD DURING SETBACK = 330. MBH

MAX SUPPLY AIRFLOW IS 50000. CFM 3/ 1/ 5AM MIN SUPPLY AIRFLOW IS 5000. CFM 1/ 1/ 9AM

TABLE 11-54

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

ELECTROLUX-B 120 TONS 50 470 CLEVELAND COMPOSITE WEATHER TAPE CALIF HP 06/08/79

YEAR MO DT DA TIME DY CC DP	SCRAD RMTS	TRLOAD RMIL	BHSHRC BHSHRI	ZSHG ZZSHG	DACFM DELHR	RTEMP RAT	AMAT HRRA	COST HOST	ISA/ZVFC ZVFH	CCLOAD CLT HCLOAD HLT	D-PROC I-PROC	HUMID BELEC
*** JAN ***												
654 1 1 3	0.	-601056.	-761292.	-832328.	3402.	72.0	23.8	56.0	5000.	0. 0	0.	0.
544 28 15 -4	14514.	114.	0.	-847684.	0.0	68.0	4.5	229.0	0.	1718015. 0	0.	7.
37 1 1 46	347036.	-258957.	0.	451316.	3780.	74.8	74.9	56.0	40127.	1100077. 0	4821.	0.
12 N 2 1 37	363237.	44913.	0.	823845.	10.15	77.9	38.6	56.0	0.	223607. 0	39536.	146.
*** FEB ***												
822 2 1 6	0.	-574069.	-761292.	-794305.	3402.	72.0	25.8	56.0	5000.	0. 0	0.	0.
544 4 3 -1	14514.	-1731.	0.	-832087.	0.0	68.1	5.4	226.1	0.	1664296. 0	0.	7.
1344 2 1 14	386761.	-546790.	0.	227527.	3780.	74.9	71.1	56.0	40904.	1000170. 0	6429.	0.
1144 11 2 2	387556.	59884.	0.	839794.	11.73	76.9	13.4	56.0	0.	511123. 0	20954.	148.
*** MAR ***												
1833 3 1 30	0.	-363389.	-761292.	-493247.	3402.	72.0	42.5	56.0	5000.	0. 0	0.	0.
544 18 10 26	14514.	1136.	0.	-717815.	0.0	69.0	20.1	203.6	0.	1237548. 0	0.	7.
1697 3 1 61	401453.	-125725.	0.	658420.	3780.	75.0	78.2	56.0	39740.	956049. 0	6107.	0.
4P4 12 1 40	382692.	56890.	0.	815901.	0.07	80.0	48.9	56.0	0.	88834. 0	19906.	148.
*** APR ***												
2334 4 4 34	0.	-324032.	-761292.	-339518.	3780.	72.0	42.6	56.0	5000.	0. 0	0.	0.
544 8 6 32	14514.	0.	0.	-556925.	0.0	69.1	26.6	175.1	0.	1047223. 0	0.	7.
2673 4 1 68	188417.	-75832.	812656.	490413.	3780.	75.5	83.0	56.4	50000.	1439998. 1	5786.	0.
8AM 22 6 53	377828.	53896.	60236.	1072952.	0.0	84.3	53.6	56.4	0.	0. 0	0.	147.
*** MAY ***												
2933 5 1 33	0.	-388547.	0.	-532920.	0.	75.9	0.0	0.0	0.	0. 0	0.	0.
544 3 0 29	14514.	-44456.	345878.	-255568.	0.0	75.1	42.0	0.0	0.	340410. 0	0.	7.
3368 5 1 65	145285.	-135183.	577940.	277189.	3780.	75.0	82.1	56.0	49856.	1404985. 0	321.	0.
7A4 6 7 44	237368.	2994.	0.	1023576.	0.0	83.5	39.8	56.0	0.	52894. 0	0.	114.
*** JUN ***												
0 0 0 0	0.	0.	0.	0.	0.	0.0	0.0	0.0	0.	0. 0	0.	0.
0 0 0	0.	0.	0.	0.	0.0	0.0	0.0	0.0	0.	0. 0	0.	0.
3968 6 2 74	239636.	-39306.	1284546.	185867.	3780.	77.0	81.1	56.0	50000.	1440000. 1	64.	0.
7A4 15 0 71	15487.	599.	60220.	1086766.	4.80	81.7	66.8	56.0	0.	0. 0	0.	7.

TABLE 11-55

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLETSHMAN-H 120 TONS 90 *70 CLEVELAND COMPOSITE WEATHER TAPE CALIF HP 06/08/79

YRHR MO DT DD TIME DY CL DP	SORAD RMIS	TRLOAD RMIL	BHSHRC BHSHRI	ZSHG TZSHG	OACFM DETHR	RTEMP RAT	AMAT HRRA	CDST HDST	ESA/ZVFC ZVFH	CCLOAD HCLOAD	CLT HLT	D-PROC I-PROC	HUMID BFLEC
*** JUL ***													
0 0 0 0	0.	0.	0.	0.	0.	0.0	0.0	0.0	0.	0.	0	0.	0.
0 0 0	0.	0.	0.	0.	0.0	0.0	0.0	0.0	0.	0.	0	0.	0.
4350 7 1 65	0.	-147464.	2438298.	-132690.	3780.	79.5	82.7	56.0	50000.	1440000.	1	0.	0.
5AM 1 0 57	14514.	0.	538067.	1562619.	1.21	84.2	63.2	56.0	0.	0.	0	0.	7.
*** AUG ***													
0 0 0 0	0.	0.	0.	0.	0.	0.0	0.0	0.0	0.	0.	0	0.	0.
0 0 0	0.	0.	0.	0.	0.0	0.0	0.0	0.0	0.	0.	0	0.	0.
5190 8 1 64	0.	-146805.	2032270.	-132291.	3780.	78.4	83.6	56.9	50000.	1440000.	1	0.	0.
5AM 5 10 64	14514.	0.	304962.	1281744.	2.54	85.2	64.4	56.9	0.	0.	0	0.	7.
*** SEP ***													
0 0 0 0	0.	0.	0.	0.	0.	0.0	0.0	0.0	0.	0.	0	0.	0.
0 0 0	0.	0.	0.	0.	0.0	0.0	0.0	0.0	0.	0.	0	0.	0.
5862 9 1 65	0.	-152303.	2645831.	-137789.	3780.	80.1	84.1	57.5	50000.	1440000.	1	0.	0.
5AM 2 10 64	14514.	0.	752228.	1699322.	3.22	85.7	65.1	57.5	0.	0.	0	0.	7.
*** OCT ***													
7136 10 1 33	0.	-368851.	0.	-131763.	3780.	74.3	43.4	56.0	5000.	0.	0	321.	0.
7AM 25 7 27	237088.	2994.	0.	281773.	0.0	75.6	22.8	56.0	0.	408537.	0	0.	114.
6643 10 1 82	350508.	45947.	0.	784010.	3780.	75.0	80.8	56.0	40707.	1185124.	0	6429.	0.
3PM 4 4 82	387556.	59884.	0.	835755.	3.38	80.7	64.1	56.0	0.	0.	0	18859.	148.
*** NOV ***													
7950 11 1 16	0.	-498027.	-640958.	-673079.	3402.	72.0	32.9	56.0	5000.	0.	0	0.	0.
5AM 28 10 9	14514.	-66843.	0.	-673724.	0.0	68.8	14.1	196.8	0.	1378090.	0	0.	7.
7550 11 1 49	272805.	-233160.	0.	417473.	3780.	75.0	75.2	56.0	37534.	1089234.	0	5786.	0.
1PM 11 6 37	377628.	53896.	0.	770611.	11.92	78.2	40.0	56.0	0.	196652.	0	36768.	147.
*** DEC ***													
8382 12 1 11	0.	-530841.	-761292.	-733491.	34 2.	72.0	29.3	56.0	5000.	0.	0	0.	0.
5AM 16 10 5	14514.	156.	0.	-808855.	0.0	68.4	7.1	221.8	0.	1577215.	0	0.	7.
8412 12 1 27	286098.	-429624.	0.	244030.	3780.	74.8	71.8	56.0	36334.	923304.	0	6429.	0.
11AM 17 9 15	387556.	59884.	0.	745973.	12.02	77.0	19.7	56.0	0.	394319.	0	19906.	148.

TABLE 11-56

DOUBLE BUNDLE FULL LOAD PERFORMANCE DATA

COOLING CAPACITY	SATURATED DISCHARGE TEMP	PEAK KW
134.00	101.40	127.30
130.50	105.00	130.30
129.00	106.40	131.60
126.00	109.40	134.20
122.00	113.50	137.70
118.00	117.50	141.20
115.70	120.00	143.30
114.00	121.70	144.70
110.00	125.80	148.10
106.00	130.10	151.40
102.00	134.50	154.60

DOUBLE BUNDLE PART LOAD PERFORMANCE DATA

PERCENT OF FULL LOAD	PERCENT OF PEAK KW
10.00	10.00
20.00	17.80
25.00	21.00
30.00	25.00
40.00	36.20
50.00	44.10
60.00	54.00
70.00	65.20
75.00	69.80
80.00	73.70
90.00	88.00
100.00	100.00

PERIMETER FAN COIL RESET TEMPERATURE SCHEDULE

OUTDOOR TEMPERATURE.	RESET TEMPERATURE
-30.00	120.00
-10.00	120.00
75.00	75.00
120.00	75.00

TABLE 11-57

TANK GALLONS	10000.
PUMP 1 KWIN	5.30
PUMP 2 KWIN	1.65
PUMP 3 KWIN	5.30
PUMP 4 KWIN	2.10
FAN COIL FANS KWIN	9.27
MINIMUM COOLING LOAD	0.160
HEATING SYS GPM	87.00
RECLAIM COND LOAD FAC	2.30
CONDENSER 1 LOAD	0.50
CONDENSER 2 LOAD	0.50
ITERATION TOLERENCE	0.100
MIN TANK TEMPERATURE	50.00
HEAT PUMP KEY	0.
TI UPWARD RESET INCREMENT	12.00
PERIMETER COOLING KEY	0.
MIN HOT G-BP COOL PERCENT	0.050
EFFIENCY OF FANCOIL FANS	0.550
BTUS HEAT FROM FANCOIL FANS	14237.3

1	146739.2	518.7	74754.1	498.6	12232.1	23.6	59759.5	179.9	3405.9
2	121306.7	519.5	55374.7	482.9	11389.1	23.6	54551.3	180.7	11769.7
3	111362.0	378.5	42181.4	357.8	12907.3	23.6	56280.7	176.5	48906.3
4	100703.9	361.1	28062.5	302.1	11744.5	23.6	60904.6	188.6	149419.0
5	97201.2	346.3	24693.4	154.6	11210.6	23.6	61303.9	176.8	227270.6
6	85197.3	326.3	23356.8	117.7	3222.4	10.6	58621.7	193.5	382332.4
7	96783.6	326.2	28555.0	117.7	3540.4	10.6	64649.8	197.9	464950.0
8	97272.2	305.9	23790.0	117.7	3540.4	10.6	62947.2	182.6	394510.3
9	79567.9	318.6	17446.9	125.2	2756.0	10.6	59368.4	187.9	289457.1
10	100450.6	312.3	24494.8	123.4	11488.4	23.6	64472.4	177.1	167476.4
11	114714.4	444.0	47586.1	399.0	11784.2	23.6	55351.4	176.6	40250.9
12	146734.7	477.4	77692.7	457.3	11848.2	23.6	57200.1	173.8	12536.4
	1291033.0	515.5	466332.2	498.6	107663.2	23.6	715410.9	198.5	2192282.0

CONDENSER TEMPERATURE BELOW MINIMUM
HEATING AND COOLING 346 HEATING ONLY 2186

TOTAL ANNUAL HEATING LOAD 1662954500. TOTAL ANNUAL COOLING LOAD 2268576260.

0 0 0 0 131 954

ELEC CONS OFFICE

3	1	146739.2
3	1	121306.7
3	1	111362.0
3	1	100703.9
3	1	97201.2
3	2	85197.3
3	2	96783.6
3	2	97272.2
3	2	79567.9
3	2	100450.6
3	1	114714.4
3	1	146734.7

ELEC DEMAND OFFICE

4	1	518.7
4	1	519.5
4	1	378.5
4	1	361.1
4	1	346.3
4	2	326.3
4	2	326.2
4	2	305.9
4	2	318.6
4	2	312.3
4	1	444.0
4	1	477.4

TABLE 11-58

```
CONSOLIDATED NATURAL GAS SYSTEM                          VER      06/06/79      PAGE      SERIAL
PANDATA                                                  10.0     16.07.26        1       019955

                                          PANVALET
                              THE PROGRAM MANAGEMENT AND SECURITY SYSTEM

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**WRITE WORK,C53A2DDATM
***** ABOVE ACTION SATISFACTORILY COMPLETED *****


 PUMP12  CHILLED WATER PUMPS          5.30 KW
 PUMP33  HOT WATER PUMPS              3.70 KW
 PUMP5   COOLING TOWER PUMPS          6.60 KW
 FANC    FANCOIL FANS                 9.27 KW
 MAXIMUM HEAT REJECTED          2300000.00 BTU
```

TABLE 11-59

TEST DATA - MODEL A-2R (V), MECH COUPLING W/CLUTCH

CONTROLS

STARTING CASE NUMBER.....	1
NUMBER OF VARIATIONS OF T1,Q1,Q7...	8760
NUMBER OF VALUES FOR COPC1 CURVE...	9
COPC1 CURVE NUMBER.....	1
NUMBER OF VALUES FOR COPC2 CURVE...	7
COPC2 CURVE NUMBER.....	1
NUMBER OF VALUES FOR ETATH CURVE...	6
ETATH CURVE NUMBER.....	1
DIAGNOSTIC CONTROL.....	0
NEXT CASE INDICATOR.....	0

GLOBAL PARAMETERS

NAMEPLATE COOLING.....	125.0TONS
NAMEPLATE COMPRESSOR 1.....	0.0HP
NAMEPLATE COMPRESSOR 2.....	150.0HP
NAMEPLATE TURBINE.....	90.0HP
GAS COST FACTOR.....	2.20PER MBTU
ELECTRICITY COST FACTOR.....	0.0400000PER KWHR
ELECTRIC DEMAND RATE.....	3.0000000PER KWHR
COOLING TOWER DESIGN LOAD.....	2500000.0BTU/HR
CHILLER EVAP. DESIGN LOAD.....	1500000.0BTU/HR
ETACC.....	1.0000FRACTION
ETAR1.....	1.0000FRACTION
ETAI.....	1.0000FRACTION
ETAG.....	0.9500FRACTION
SUPPLY TEMP TO CHILLER SYSTEM.	44.0
WATER FLOW - CHILLER SYSTEM...	250.0
HX AREA - REF EVAPORATOR.....	800.0
HX U/A U - REF EVAPORATOR.....	125.0
HX AREA - REF CON HEAT SYSTEM.	100.0
HX U/A U - REF CON HEAT SYS...	115.0
HX AREA - REF CON COOL TOWER..	1250.0
HX U/A U - REF CON COOL TOWER.	115.0
HX AREA - BANK CON HEAT SYS...	361.0
HX U/A U - BANK CON HEAT SYS..	300.0
HX AREA - BANK CON COOL TOWER.	361.0
HX U/A U - BANK CON COOL TOWER	300.0
Q1U.....	715780.0
FREON REFRIGERANT.....	R12
ETACON.....	1.0000
ETAMM.....	0.9260
ETAGG.....	0.9850
FIX LOSSES MOTOR + COMP.....	3.8000
FIX LOSSES WIND + FRICTION....	0.4476
FIX LOSSES TURBINE SHAFT.....	9.2000
ETAB.....	0.8300FRACTION
COOLING TOWER APPROACH TEMP...	5.0000
SUPPLY TEMP TO HEAT SYSTEM....	110.0000
WATER FLOW - HEAT SYSTEM.....	200.0000
WATER FLOW - COOLING TOWER....	310.0000
TV.....	75.0000
EPSV.....	0.0
CHANGE IN AIR TEMP.....	25.0000
[illegible].....	0.0000
[illegible].....	2.0000

TABLE 11-60

```
          TEST DATA - MODEL A-28 (V), MECH COUPLING W/CLUTCH
          --------------------------------------------------
LIMITING VALUES
---------------
     MAX SCFMVL..................... 6000.0000
     MAX SCFMOL.....................    0.0
     MAX EQUIVMIZER................34000.0000

LOAD CONTROLS
-------------

     ELECTRIC LOAD SUPPLIED BY SYSTEM..E(1)

     ELECTRIC LOAD SUPPLIED BY SYSTEM..E(2)

     ELECTRIC LOAD SUPPLIED BY SYSTEM..E(3)

     ELECTRIC LOAD SUPPLIED BY SYSTEM..E(4)

     ELECTRIC LOAD SUPPLIED BY SYSTEM..E(5)

     ELECTRIC LOAD SUPPLIED BY SYSTEM..E(6)

     ELECTRIC LOAD SUPPLIED BY SYSTEM..E(7)

COPC1 CURVE NUMBER     1
---------------------
  COPC1 2.600 3.050 3.600 4.250 5.150 6.450 8.45010.0001[illegible].500
  VTIC1 -20.0 -10.0   0.0  10.0  20.0  30.0  40.0  45.0  50.0

COPC2 CURVE NUMBER     1
---------------------
  COPC2 2.3[illegible] 2.3[illegible] 3.850 5.800 5.000 4.230 3.500
  VTIC2 -20.0  17.5  40.0  64.0  87.0  86.0 113.0

ETATH CURVE NUMBER     1
---------------------
  ETATH 0.322 0.317 0.308 0.304 0.302 0.287
  VTIETH  70.0 100.0 110.0 115.0 120.0 140.0

COPC1 CORRECTION FACTOR CURVE NUMBER     1
-----------------------------------------
  CF1 0.100 0.100 0.561 0.696 0.779 0.822 0.884 0.937 1.000 1.000
  PWR1    0.    5.   30.   40.   50.   60.   80.   90.  100.  150.

COPC2 CORRECTION FACTOR CURVE NUMBER     1
-----------------------------------------
  CF2 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000
  PWR2    0.    5.   30.   40.   50.   60.   80.   90.  100.  150.

ETATH CORRECTION FACTOR CURVE NUMBER     1
-----------------------------------------
  CFE 1.000 1.000 1.000 1.000 1.000
  PWRE    0.   10.   60.  100.  150.
```

TABLE 11-61

NO.	GAS IN	ELEC PEAK	ELEC IN	ELEC GEN	REJ HEAT
1	676.5	157.5	33743.2	37575.7	72342.4
2	596.3	138.5	31563.5	33943.9	92413.1
3	632.1	152.5	32070.8	37248.6	152019.2
4	576.7	173.4	39871.0	32784.7	253460.3
5	576.2	192.4	41904.4	31309.6	343929.7
6	273.6	251.2	59239.5	5151.2	464122.2
7	269.3	246.0	68803.7	2871.3	564278.4
8	294.4	230.9	63121.5	4359.1	507665.6
9	246.3	239.6	54667.7	7829.2	333405.8
10	585.3	198.5	43818.1	32535.1	306869.2
11	619.4	150.8	31987.2	35678.7	153670.1
12	667.7	137.9	31562.6	37468.5	73823.5
	6031.0	251.2	532351.1	298755.4	3317999.5

NUMBER OF HOURS THAT EXPORT ELECTRIC POWER GREATER THAN BUILDING LOAD 2480
ANNUAL ACCUMULATED EXPORT POWER GREATER THAN BUILDING LOAD 58863.3

TOTAL = 1260078354.7 BTU Q1 * TIME
TOTAL = 1701124803.7 BTU Q7 * TIME
TOTAL = 1260078354.7 BTU Q24 * TIME
TOTAL = 6151581377.3 BTU Q11 * TIME
TOTAL = 0.0 BTU Q15 * TIME
TOTAL = 123203.3 KW HR REQUIRED BY PARASITICS
TOTAL = 7737.3 KW HR PURCHASED FOR PARASITICS
TOTAL = 19394.3 KW HR PURCHASED (MOTOR + PARA) TOTAL
TOTAL = 183299.1 KW HR EXPORTED TO UTILITY
TOTAL = 3985483851.7 BTU TO GENERATE ELECTRICAL POWER
TOTAL = 3317999960.0 BTU Q8T * TIME
TOTAL = 0.0 BTU Q12 * TIME
TOTAL = 0.0 BTU Q13 * TIME
TOTAL = 115744556.9 BTU Q9 * TIME
TOTAL = 6045024.2 BTU QP *TIME

TOTAL = 0.0 C1 * TIME
TOTAL = 83645.6 C2 * TIME
TOTAL = 0.0 C1 HOURS
TOTAL = 1868.0 C2 HOURS
TOTAL = 6940.0 HOURS

MAX TSHP = 92.1 HP
MAX RSHP = 66.6 HP
MAX GEN = 51.5 KW
MAX CMP1 = 0.0 HP
MAX CMP2 = 129.4 HP
MAX TPPW = 61.8 KW
MAX Q34 = 1769359.4 BTU
MAX Q33 = 496774.9 BTU
MAX Q11 = 2319188.9 BTU
MAX Q8T = 2262800.4 BTU
MAX Q5 = 2262800.4 BTU
MAX Q15 = 0.0 BTU
MAX Q14 = 1440000.0 BTU
MAX Q13 = 0.0 BTU
MAX Q12 = 0.0 BTU
MAX Q933 = 1701725.0 BTU
MAX Q9 = 1209146.8 BTU
MAX Q1 = 1440000.0 BTU
MAX Q7 = 1701725.0 BTU
MAX QP = 39536.0 BTU

COST OF GAS.....	13533.48
COST OF PUR ELECTRIC.....	735.77
CREDIT FOR EXP POWER.....	7331.96
ANNUAL UTIL DEMAND CHARGES....	2223.65
TOTAL ANNUAL OPERATING COST...	9160.94

TABLE 11-62

```
CONSOLIDATED NATURAL GAS SYSTEM                    VER      06/08/79      PAGE      SERIAL
PANDATA                                            10.0     17.14.48        1       019955

                                              PANVALET
                                THE PROGRAM MANAGEMENT AND SECURITY SYSTEM

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**WRITE WORK,C53048DATM
***** ABOVE ACTION SATISFACTORILY COMPLETED *****


PUMP12   CHILLED WATER PUMPS        5.30 KW
PUMP34   HOT WATER PUMPS            3.70 KW
PUMP5    COOLING TOWER PUMPS        6.80 KW
FANC     FANCOIL FANS               9.27 KW
MAXIMUM  HEAT REJECTED          2300200.00 BTU
```

TABLE 11-63

```
TEST DATA - MODEL B-4 (VIII), ELECTRICAL COUPLING
-------------------------------------------------

CONTROLS
--------

     STARTING CASE NUMBER..............    1
     NUMBER OF VARIATIONS OF T1,Q1,Q7... 8760
     NUMBER OF VALUES FOR COPC1 CURVE...    9
     COPC1 CURVE NUMBER................    1
     NUMBER OF VALUES FOR COPC2 CURVE...    7
     COPC2 CURVE NUMBER................    1
     NUMBER OF VALUES FOR ETATH CURVE...    6
     ETATH CURVE NUMBER................    1
     DIAGNOSTIC CONTROL................    0
     NEXT CASE INDICATOR...............    0

GLOBAL PARAMETERS
-----------------

     NAMEPLATE COOLING.............     125.0TONS
     NAMEPLATE COMPRESSOR 1........       0.0HP
     NAMEPLATE COMPRESSOR 2........     150.0HP
     NAMEPLATE TURBINE.............      90.0HP
     GAS COST FACTOR...............       2.20PER     MBTU
     ELECTRICITY COST FACTOR.......  0.0400000PER     KWHR
     ELECTRIC DEMAND RATE..........  3.0000000PER     KWHR
     COOLING TOWER DESIGN LOAD.....  2500000.0BTU/HR
     CHILLER EVAP. DESIGN LOAD.....  1500000.0BTU/HR
     ETACL.........................     1.0000FRACTION
     ETAKL.........................     1.0000FRACTION
     ETAI..........................     1.0000FRACTION
     ETAG..........................     0.9500FRACTION
     SUPPLY TEMP TO CHILLER SYSTEM.      44.0
     WATER FLOW - CHILLER SYSTEM...     250.0
     HX AREA - REF EVAPORATOR......     800.0
     HX U/A U - REF EVAPORATOR.....     125.0
     HX AREA - REF CON HEAT SYSTEM.     100.0
     HX U/A U - REF CON HEAT SYS...     115.0
     HX AREA - REF CON COOL TOWER..    1250.0
     HX U/A U - REF CON COOL TOWER.     115.0
     HX AREA - RANK CON HEAT SYS...     361.0
     HX U/A U - RANK CON HEAT SYS..     300.0
     HX AREA - RANK CON COOL TOWER.     361.0
     HX U/A U - RANK CON COOL TOWER     300.0
     Q16...........................  715780.0
     FREON REFRIGERANT.............       R12
     ETACON........................     0.9700
     ETAMM.........................     0.9400
     ETAGG.........................     0.9850
     FIX LOSSES MOTOR + COMP.......     3.6000
     FIX LOSSES WIND + FRICTION....     1.0000
     FIX LOSSES TURBINE SHAFT......     1.6000
     ETAB..........................     0.6500FRACTION
     COOLING TOWER APPROACH TEMP...     5.0000
     SUPPLY TEMP TO HEAT SYSTEM....   110.0000
     WATER FLOW - HEAT SYSTEM......   200.0000
     WATER FLOW - COOLING TOWER....   310.0000
     TV............................    75.0000
     EPSV..........................     0.0
     CHANGE IN AIR TEMP............    20.0000
     UA TOLERANCE..................     0.0000
```

TABLE 11-64

```
TEST DATA - MODEL B-4 (VIII), ELECTRICAL COUPLING
-------------------------------------------------

LIMITING VALUES
---------------

     MAX SCFMVE...................... 6000.0000
     MAX SCFMOL.....................      0.0
     MAX ECONOMIZER................34000.0000

LOAD CONTROLS
-------------

     ELECTRIC LOAD SUPPLIED BY  SYSTEM..E(1)

     ELECTRIC LOAD SUPPLIED BY  SYSTEM..E(2)

     ELECTRIC LOAD SUPPLIED BY  SYSTEM..E(3)

     ELECTRIC LOAD SUPPLIED BY  SYSTEM..E(4)

     ELECTRIC LOAD SUPPLIED BY  SYSTEM..E(5)

     ELECTRIC LOAD SUPPLIED BY  SYSTEM..E(6)

     ELECTRIC LOAD SUPPLIED BY  SYSTEM..E(7)

COPC1 CURVE NUMBER    1
---------------------
  COPC1 2.600 3.050 3.600 4.250 5.150 6.450 8.45010.00017.500
  VTIC1 -20.0 -10.0   0.0  10.0  20.0  30.0  40.0  45.0  50.0

COPC2 CURVE NUMBER    1
---------------------
  COPC2 2.300 2.300 3.850 5.800 5.300 4.200 3.500
  VTIC2 -20.0  17.5  40.0  64.0  67.0  86.0 110.0

ETATH CURVE NUMBER    1
---------------------
  ETATH 0.322 0.312 0.308 0.304 0.302 0.287
  VTIETH  70.0 100.0 110.0 115.0 120.0 140.0

COPC1 CORRECTION FACTOR CURVE NUMBER    1
----------------------------------------
  CF1 0.100 0.100 0.561 0.696 0.779 0.822 0.884 0.937 1.000 1.000
  PWR1    0.    5.   30.   40.   50.   60.   80.   90.  100.  150.

COPC2 CORRECTION FACTOR CURVE NUMBER    1
----------------------------------------
  CF2 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000
  PWR2    0.    5.   30.   40.   50.   60.   80.   90.  100.  150.

ETATH CORRECTION FACTOR CURVE NUMBER    1
-----------------------------------------
  CFE 1.000 1.000 1.000 1.000 1.000
  PWRE    0.   10.   60.  100.  150.
  PWRE    0.   10.   60.  100.  150.
```

TABLE 11-65

```
TOTAL =        1260879354.7 BTU Q1 * TIME
TOTAL =        1701124803.7 BTU Q7 * TIME
TOTAL =        1267778354.7 BTU Q24 * TIME
TOTAL =        5124408936.1 BTU Q11 * TIME
TOTAL =                0.0 BTU Q15 * TIME
TOTAL =            12327[illegible].3 KW HR REQUIRED BY PARASITICS
TOTAL =             7606.4 KW HR PURCHASED FOR PARASITICS
TOTAL =            18198.6 KW HR PURCHASED (MOTOR + PARA) TOTAL
TOTAL =           229196.3 KW HR EXPORTED TO UTILITY
TOTAL =        4580376859.1 BTU TO GENERATE ELECTRICAL POWER
TOTAL =        3317999463.0 BTU Q81 * TIME
TOTAL =                0.0 BTU Q12 * TIME
TOTAL =                0.0 BTU Q13 * TIME
TOTAL =         11574556.9 BTU Q9  * TIME
TOTAL =          6345729[illegible].2 BTU JP *TIME

TOTAL =                0.0 C1 * TIME
TOTAL =            83645.6 C2 * TIME
TOTAL =                0.0 C1 HOURS
TOTAL =             1868.0 C2 HOURS
TOTAL =             6940.0 HOURS

      MAX TSHP =                92.1 HP
      MAX MSHP =               136.5 HP
      MAX GEN  =                59.2 KW
      MAX CMP1 =                 0.0 HP
      MAX CMP2 =               129.4 HP
      MAX TPPW =                61.1 KW
      MAX  Q34 =           1769359.4 BTU
      MAX  Q33 =            496774.9 BTU
      MAX  Q11 =           2319188.9 BTU
      MAX  Q8T =           2262803.4 BTU
      MAX   Q5 =           2262800.4 BTU
      MAX  Q15 =                 0.0 BTU
      MAX  Q14 =           1440000.0 BTU
      MAX  Q13 =                 0.0 BTU
      MAX  Q12 =                 0.0 BTU
      MAX Q933 =           1701725.0 BTU
      MAX   Q9 =           1209146.8 BTU
      MAX Q1 =            1440000.0 BTU
      MAX J7 =            1701725.0 BTU
      MAX JP =              39532.0 BTU

COST OF GAS.................                13473.70
COST OF PUR ELECTRIC........                  727.94
CREDIT FOR EXP POWER........                 9127.85
ANNUAL UTIL DEMAND CHARGES..                 2199.84
TOTAL ANNUAL OPERATING COST...               7273.63
```

TABLE 11-66

MO.	GAS IN	ELEC IN	ELEC PEAK	ELEC GEN	
1	676.5	129.8	28015.4	43303.4	72342.4
2	596.3	130.8	26390.0	39117.4	92413.1
3	632.0	146.8	26400.1	42919.3	152019.2
4	575.4	170.4	34919.4	37736.3	253460.3
5	574.1	192.5	37204.2	36010.5	343929.7
6	255.5	250.6	54535.5	5356.7	464122.2
7	264.1	243.4	68385.6	3256.1	564278.4
8	289.2	230.4	62534.2	4944.8	507665.6
9	241.0	239.1	53581.5	8911.1	333405.8
10	583.4	198.4	38912.9	37440.4	306869.2
11	619.2	147.4	26559.4	41106.5	153670.1
12	667.7	131.2	25857.1	43179.0	73823.5
	6004.3	250.6	487258.3	343781.4	3317999.5

NUMBER OF HOURS THAT EXPORT ELECTRIC POWER GREATER THAN BUILDING LOAD 2508
ANNUAL ACCUMULATED EXPORT POWER GREATER THAN BUILDING LOAD 77991.0

TABLE 11-67

EQUIPMENT ENERGY CONSUMPTION AND OPERATING DATA FOR

COOLING TOWER OPERATION

NSYS	TAPES	NPV	NTP	NCT	NBT	NGT	NLS	S/KEY	T/KEY	FLOOR AREA	BASIS	RATIO	HVH	HVL	AF NAME	UNITS	HT VALUE
3	2	1	5	2	0	0	0	0	0	58800.	0	0.0	1020.	955.			0.

PART LOAD PERCENTAGE VARIATION PROFILES

NO	0.	10.	20.	25.	30.	40.	50.	60.	70.	75.	80.	90.	
1	0.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	CHILLER

AMBIENT TEMPERATURE/PERCENT OF RATED VALUE PROFILES

NO	TEMP/PCT,CWT	TEMP/PCT,CWT	TEMP/PCT,CWT	TEMP/PCT,CWT	TEMP/PCT,CWT	TEMP/PCT,CWT	KEY	
1	56./ 220.0	72./ 151.0	75./ 127.0	78./ 100.0	80./ 81.0	95./ 0.0	0	TWR WITH FAN CONST
2	56./ 26.4	72./ 18.1	75./ 15.2	78./ 12.0	80./ 9.7	95./ 0.0	0	TWR W/O FAN CONST
3	36./ 220.0	52./ 151.0	55./ 127.0	58./ 100.0	60./ 81.0	75./ 0.0	0	TWR WITH FAN VAR
4	36./ 26.4	52./ 18.1	55./ 15.2	58./ 12.0	60./ 9.7	75./ 0.0	0	TWR W/O FAN VAR
5	60./ 70.0	90./ 100.0	0./ 0.0	0./ 0.0	0./ 0.0	0./ 0.0	0	

CHILLER DATA

CH ID	CH TYP	MIN START	RATED TONS	MAX INPUT MBH OR KW	MAX REC HEAT MBH	MAX AF INP MBH	PILOT F INP MBH	ACCESS A KW,MBH	TY	ACCESS B KW,MBH	TY	PT LD PROF NOS PF	RH	AF	AA	AB	AMB TEMP PROF NOS DC	EI	RH	AA	AB
1	5	0.	168.0	0.	0.	0.	0.	0.	0	0.	0	1	0	0	0	0	0	0	0	0	0
2	5	0.	192.0	0.	0.	0.	0.	0.	0	0.	0	1	0	0	0	0	0	0	0	0	0

SYSTEM IDENTIFICATION LABELS

SYS 1 COOLING TOWER NO. 1 CONSTANT RETURN TEMP 85 SET DOUBLE BUNDLE
SYS 2 COOLING TOWER NO. 2 VARIABLE RETURN TEMP 65 MIN GAS HEAT PUMP MECH
SYS 3 COOLING TOWER NO. 2 VARIABLE RETURN TEMP 65 MIN GAS HEAT PUMP ELEC

SYSTEM ACCESSORIES AND GENERAL DATA

SYS ID	ACCESSORY A KW,MBH	TY	KY	ACCESSORY B KW,MBH	TY	KY	ACCESSORY C KW,MBH	TY	KY	ACCESSORY D KW,MBH	TY	KY	TOWER FAN KW	PROF NOS WF	NF	CW	MIN IMP	FLOOR AREA	AUXILIARY FUEL DATA AF NAME	UNITS	HT VALUE
1	0.	0	0	0.	0	0	0.	0	0	0.	0	0	9.	1	2	0	0.	0.			0.
2	0.	0	0	0.	0	0	0.	0	0	0.	0	0	11.	3	4	5	65.	0.			0.
3	0.	0	0	0.	0	0	0.	0	0	0.	0	0	11.	3	4	5	65.	0.			0.

SYSTEM CHARACTERISTICS

SYS ID	TP NO	SYS MUL	GRP NO	GRP KEY	AF KEY	SIM KEY	O-P KEY	PS KEY	LMT KEY	CRH SCH	LSC KEY	CHR SCH	CHILLER ID NUMBERS 1	2	3	4	5	6	7	8	CSL JAN	CSL JUL
1	1	0.0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0.	0.
2	2	0.0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0.	0.
3	3	0.0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0.	0.

SYS ID	BOILER ID NUMBERS 1	2	3	4	5	6	7	8	WHB ID	BEP ID	PCT DF	HSL JAN	HSL JUL	HT PMP LP IMPS UPPER	LOWER
1	0	0	0	0	0	0	0	0	0	0	0.	0.	0.	0	0
2	0	0	0	0	0	0	0	0	0	0	0.	0.	0.	0	0
3	0	0	0	0	0	0	0	0	0	0	0.	0.	0.	0	0

TABLE 11-68

EQUIPMENT ENERGY CONSUMPTION AND OPERATING DATA FOR

COOLING TOWER OPERATION

SYSTEM 1 COOLING TOWER NO. 1 CONSTANT RETURN TEMP 85 SET DOUBLE BUNDLE
SYSTEM 2 COOLING TOWER NO. 2 VARIABLE RETURN TEMP 65 MIN GAS HEAT PUMP MECH
SYSTEM 3 COOLING TOWER NO. 2 VARIABLE RETURN TEMP 65 MIN GAS HEAT PUMP ELEC

FUEL AND POWER CONSUMPTION

SYS	GAS USAGE MCF	PEAK DAY GAS MCF	ELECTRIC USAGE KWH	PEAK ELEC DEMAND (60 MIN)	AUXILIARY FUEL USAGE
** JAN **					
1	0.	0.	0.	0.	0.
2	0.	0.	0.	0.	0.
3	0.	0.	0.	0.	0.
** FEB **					
1	0.	0.	3.	1.	0.
2	0.	0.	0.	0.	0.
3	0.	0.	0.	0.	0.
** MAR **					
1	0.	0.	24.	2.	0.
2	0.	0.	29.	2.	0.
3	0.	0.	29.	2.	0.
** APR **					
1	0.	0.	127.	4.	0.
2	0.	0.	272.	8.	0.
3	0.	0.	272.	8.	0.
** MAY **					
1	0.	0.	223.	3.	0.
2	0.	0.	553.	9.	0.
3	0.	0.	553.	9.	0.
** JUN **					
1	0.	0.	826.	7.	0.
2	0.	0.	2019.	11.	0.
3	0.	0.	2019.	11.	0.
** JUL **					
1	0.	0.	1067.	7.	0.
2	0.	0.	2602.	10.	0.
3	0.	0.	2602.	10.	0.
** AUG **					
1	0.	0.	765.	6.	0.
2	0.	0.	2285.	10.	0.
3	0.	0.	2285.	10.	0.
** SEP **					
1	0.	0.	765.	6.	0.
2	0.	0.	1282.	10.	0.
3	0.	0.	1282.	10.	0.

TABLE 11-69

FUEL AND POWER CONSUMPTION

SYS	GAS USAGE MCF	PEAK DAY GAS MCF	ELECTRIC USAGE KWH	PEAK ELEC DEMAND (60 MIN)	AUXILIARY FUEL USAGE
** OCT **					
1	0.	0.	156.	3.	0.
2	0.	0.	472.	9.	0.
3	0.	0.	472.	9.	0.
** NOV **					
1	0.	0.	28.	3.	0.
2	0.	0.	106.	6.	0.
3	0.	0.	106.	6.	0.
** DEC **					
1	0.	0.	7.	2.	0.
2	0.	0.	4.	1.	0.
3	0.	0.	4.	1.	0.
** ANN **					
1	0.	0.	3691.	7.	0.
2	0.	0.	9624.	11.	0.
3	0.	0.	9624.	11.	0.

OUTPUT SUMMARY

COOLING TOWER OPERATION

SYSTEM 1 COOLING TOWER NO. 1 CONSTANT RETURN TEMP 85 SET DOUBLE BUNDLE
SYSTEM 2 COOLING TOWER NO. 2 VARIABLE RETURN TEMP 65 MIN GAS HEAT PUMP MECH
SYSTEM 3 COOLING TOWER NO. 2 VARIABLE RETURN TEMP 65 MIN GAS HEAT PUMP ELEC

UNIT VALUES OF ANNUAL UTILITY CONSUMPTION

SYS	GAS USAGE MCF/SQFT	ELEC USAGE KWH/SQFT	ELEC DMD WATTS/SQFT	AUX FUEL UNITS/SQFT
1	0.0	0.06	0.121	0.0
2	0.0	0.16	0.179	0.0
3	0.0	0.16	0.179	0.0

PEAK BOILER REQUIREMENTS FOR THE YEAR (MBH)

SYS	RECOV HEAT BOILER LOAD	SUPPLEMENTAL BOILER LOAD	COMBINED BOILER LOAD
1	0.	0.	0.
2	0.	0.	0.
3	0.	0.	0.

ANNUAL EQUIVALENT ENERGY CONSUMPTION (WITHOUT CONVERSION OR DISTRIBUTION LOSSES BY ENERGY TYPE)

SYS	BTU/SQ FT/YR
1	214.
2	559.
3	559.

TABLE 11-70

EQUIPMENT OPERATING HOURS

COOLING TOWER OPERATION

SYSTEM 1	COOLING TOWER NO. 1	CONSTANT RETURN TEMP	85	SET	DOUBLE BUNDLE	
SYSTEM 2	COOLING TOWER NO. 2	VARIABLE RETURN TEMP	65	MIN	GAS HEAT PUMP	MECH
SYSTEM 3	COOLING TOWER NO. 2	VARIABLE RETURN TEMP	65	MIN	GAS HEAT PUMP	ELEC

SYS	CHILLER OPERATING HOURS NO. 1	2	3	4	5	6	7	8	BOILER OPERATING HOURS NO. 1	2	3	4	5	6	7	8
** JAN **																
1	14															
2	535															
3	535															
** FEB **																
1	23															
2	561															
3	561															
** MAR **																
1	81															
2	700															
3	700															
** APR **																
1	189															
2	675															
3	675															
** MAY **																
1	253															
2	679															
3	679															
** JUN **																
1	304															
2	314															
3	314															
** JUL **																
1	334															
2	336															
3	336															
** AUG **																
1	334															
2	342															
3	342															
** SEP **																
1	269															
2	285															
3	285															
** OCT **																
1	209															
2	699															
3	699															
** NOV **																
1	67															
2	649															
3	649															
** DEC **																
1	20															
2	544															
3	544															
** ANN **																
1	2358															
2	6310															
3	6310															

** ANN FULL LOAD HOURS **

1	1087
2	1439
3	1439

TABLE 11-71

OUTPUT FILE FOR MUC PROGRAM

COOLING TOWER OPERATION

SYS	MO	GAS DEMAND MCF	GAS CONSUMP MCF	ELEC DEMAND KW	ELEC CONSUMP KWH	AUX FUEL CONSUMP	AUX FUEL HOURS	COOLING DEMAND TONS	COOLING CONSUMP TON-HRS	TOT STM DEMAND MBH	TOT STM CONSUMP MBTU
SYSTEM 1	COOLING TOWER NO. 1 CONSTANT RETURN TEMP 85 SET DOUBLE BUNDLE										
1	1	0.	0.	0.	0.	0.	0.	49.	284.	0.	0.
1	2	0.	0.	1.	3.	0.	0.	98.	981.	0.	0.
1	3	0.	0.	2.	24.	0.	0.	120.	4076.	0.	0.
1	4	0.	0.	4.	127.	0.	0.	168.	12452.	0.	0.
1	5	0.	0.	3.	223.	0.	0.	147.	18939.	0.	0.
1	6	0.	0.	7.	826.	0.	0.	153.	31861.	0.	0.
1	7	0.	0.	7.	1367.	0.	0.	153.	38746.	0.	0.
1	8	0.	0.	6.	765.	0.	0.	153.	32876.	0.	0.
1	9	0.	0.	6.	465.	0.	0.	162.	24121.	0.	0.
1	10	0.	0.	3.	156.	0.	0.	127.	13956.	0.	0.
1	11	0.	0.	3.	28.	0.	0.	146.	3354.	0.	0.
1	12	0.	0.	2.	7.	0.	0.	115.	1045.	0.	0.
SYSTEM 2	COOLING TOWER NO. 2 VARIABLE RETURN TEMP 65 MIN GAS HEAT PUMP MECH										
2	1	0.	0.	0.	0.	0.	0.	32.	6028.	0.	0.
2	2	0.	0.	0.	0.	0.	0.	33.	7701.	0.	0.
2	3	0.	0.	2.	29.	0.	0	79.	12668.	0.	0.
2	4	0.	0.	8.	272.	0.	0.	136.	21121.	0.	0.
2	5	0.	0.	9.	553.	0.	0.	157.	28659.	0.	0.
2	6	0.	0.	11.	2019.	0.	0.	189.	38676.	0.	0.
2	7	0.	0.	10.	2602.	0.	0.	187.	47021.	0.	0.
2	8	0.	0.	10.	2285.	0.	0.	184.	42304.	0.	0.
2	9	0.	0.	10.	1282.	0.	0.	187.	27783.	0.	0.
2	10	0.	0.	9.	472.	0.	0.	163.	25571.	0.	0.
2	11	0.	0.	6.	106.	0.	0.	110.	12805.	0.	0.
2	12	0.	0.	1.	4.	0.	0.	40.	6152.	0.	0.
SYSTEM 3	COOLING TOWER NO. 2 VARIABLE RETURN TEMP 65 MIN GAS HEAT PUMP ELEC										
3	1	0.	0.	0.	0.	0.	0.	32.	6028.	0.	0.
3	2	0.	0.	0.	0.	0.	0.	33.	7701.	0.	0.
3	3	0.	0.	2.	29.	0.	0.	79.	12668.	0.	0.
3	4	0.	0.	8.	272.	0.	0.	136.	21121.	0.	0.
3	5	0.	0.	9.	553.	0.	0.	157.	28659.	0.	0.
3	6	0.	0.	11.	2019.	0.	0.	189.	38676.	0.	0.
3	7	0.	0.	10.	2602.	0.	0.	187.	47021.	0.	0.
3	8	0.	0.	10.	2285.	0.	0.	184.	42304.	0.	0.
3	9	0.	0.	10.	1282.	0.	0.	187.	27783.	0.	0.
3	10	0.	0.	9.	472.	0.	0.	163.	25571.	0.	0.
3	11	0.	0.	6.	106.	0.	0.	110.	12805.	0.	0.
3	12	0.	0.	1.	4.	0.	0.	40.	6152.	0.	0.
ANNUAL VALUES FOR ALL SYSTEMS (NOT INCLUDED ON OUTPUT FILE FOR MUC)											
1	ANN	0.	0.	7.	3691.	0.	0.	163.	182690.	0.	0.
2	ANN	0.	0.	11.	9624.	0.	0.	189.	276488.	0.	0.
3	ANN	0.	0.	11.	9624.	0.	0.	189.	276488.	0.	0.

TABLE 11-72

EQUIPMENT ENERGY CONSUMPTION AND OPERATING DATA FOR

CONVENTIONAL HEATING AND COOLING

NSYS	TAPES	NPV	NTP	NCT	NBI	NGT	NLS	S/KEY	T/KEY	FLOOR AREA	BASIS	RATIO	HVH	HVL	AF NAME	UNITS	HT VALUE
2	1	5	7	2	3	0	0	1	1	58800.	0	0.0	1020.	955.			0.

PART LOAD PERCENTAGE VARIATION PROFILES

NO	5.	10.	20.	25.	30.	40.	50.	60.	70.	75.	80.	90.	
1	0.0	10.0	17.8	21.0	25.0	36.2	44.1	54.0	65.2	69.8	73.7	88.0	RECIP CHILLER
2	0.0	10.0	20.0	25.0	30.0	40.0	50.0	60.0	70.0	75.0	80.0	90.0	ELEC BOILER
3	0.0	19.1	28.6	32.7	36.9	45.1	53.7	62.5	71.8	76.5	81.2	90.6	GAS BOILER
4	0.0	10.0	20.0	25.0	30.0	40.0	50.0	60.0	70.0	75.0	80.0	90.0	HP CHILLER
5	0.0	10.0	20.0	25.0	30.0	40.0	50.0	60.0	70.0	75.0	80.0	90.0	HP BOILER

AMBIENT TEMPERATURE/PERCENT OF RATED VALUE PROFILES

NO	TEMP/PCT,CWT	TEMP/PCT,CWT	TEMP/PCT,CWT	TEMP/PCT,CWT	TEMP/PCT,CWT	TEMP/PCT,CWT	KEY	
1	56./ 220.0	72./ 151.0	75./ 127.0	78./ 100.0	80./ 81.0	95./ 0.0	0	TWR WITH FAN CONST
2	56./ 26.4	72./ 18.1	75./ 15.2	78./ 12.0	80./ 9.7	95./ 0.0	0	TWR W/O FAN CONST
3	75./ 106.0	85./ 100.0	95./ 95.0	0./ 0.0	0./ 0.0	0./ 0.0	0	HP CHILLER
4	60./ 89.6	70./ 100.0	80./ 110.0	0./ 0.0	0./ 0.0	0./ 0.0	0	HP BOILER
5	75./ 94.4	85./ 100.0	95./ 106.0	0./ 0.0	0./ 0.0	0./ 0.0	0	HP CHILLER INPUT
6	75./ 102.0	85./ 100.0	95./ 96.3	0./ 0.0	0./ 0.0	0./ 0.0	0	HP CHILLER REJ HT
7	60./ 89.5	70./ 100.0	80./ 110.0	0./ 0.0	0./ 0.0	0./ 0.0	0	HP BOILER INPUT

CHILLER DATA

CH ID	CH TYP	MIN START	RATED TONS	MAX INPUT MBH OR KW	MAX REC HEAT MBH	MAX AF INP MBH	PILOT F INP MBH	ACCESS A KW,MBH	TY	ACCESS B KW,MBH	TY	PT LD PROF NOS PF	RH	AF	AA	AB	AMB TEMP PROF NOS OC	EI	RH	AA	AB
1	5	17.	130.5	130.	0.	0.	0.	0.	0	0.	0	1	0	0	0	0	0	0	0	0	0
2	5	10.	120.6	179.	2100.	0.	0.	0.	0	0.	0	4	4	0	0	0	3	5	6	C	0

BOILER, PROCESS OR HEAT PUMP EQUIPMENT DATA

BL ID	BL TYPE	RATED OUTPUT MBH	MAX INPUT MBH,KW	ACCESS A KW,MBH	TY	ACCESS B KW,MBH	TY	PT LD PROF NOS EI	AA	AB	HT PUMP PERCENT	HTP KEY	AMB PROFILES OUTPUT	INPUT
1	0	915.	1126.	0.	0	0.	0	3	0	0	0.0	0	0	0
2	7	491.	158.	0.	0	0.	0	5	0	0	23.0	0	4	7
3	2	666.	195.	0.	0	0.	0	2	0	0	0.0	0	0	0

SYSTEM IDENTIFICATION LABELS

SYS 1 RECIP CHILLER WITH GAS BOILER

SYS 2 CALIFORNIA HEAT PUMP SYSTEM

SYSTEM ACCESSORIES AND GENERAL DATA

SYS ID	ACCESSORY A KW,MBH	TY	KY	ACCESSORY B KW,MBH	TY	KY	ACCESSORY C KW,MBH	TY	KY	ACCESSORY D KW,MBH	T/	KY	TOWER FAN KW	PROF NOS WF	NF	CW	MIN TMP	FLOOR AREA	AUXILIARY FUEL DATA AF NAME	UNITS	HT VALUE
1	3.	0	2	5.	0	3	5.	0	3	0.	0	0	9.	1	2	0	0.	0.			0.
2	9.	0	1	0.	0	0	0.	0	0	0.	0	0	15.	1	2	0	0.	0.			0.

TABLE 11-73

SYSTEM CHARACTERISTICS

SYS ID	TP NO	SYS MUL	GRP NO	GRP KEY	AP KEY	STM KEY	O-P KEY	PS KEY	LMT KEY	CRH SCH	LSC KEY	CHR SCH	CHILLER ID NUMBERS 1	2	3	4	5	6	7	8	CSL JAN	CSL JUL
1	1	0.0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0.	0.
2	2	0.0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0.	0.

SYS ID	BOILER ID NUMBERS 1	2	3	4	5	6	7	8	WHB ID	DFP ID	PCT OF	HSL JAN	HSL JUL	HT PMP UPPER	LP TMPS LOWER
1	1	2	0	0	0	0	0	0	0	0	0.	0.	0.	0	0
2	2	3	0	0	0	0	0	0	0	0	0.	0.	0.	90	70

TABLE 11-74

EQUIPMENT ENERGY CONSUMPTION AND OPERATING DATA FOR

CONVENTIONAL HEATING AND COOLING

SYSTEM 1 RECIP CHILLER WITH GAS BOILER
SYSTEM 2 CALIFORNIA HEAT PUMP SYSTEM

FUEL AND POWER CONSUMPTION

SYS	GAS USAGE MCF	PEAK DAY GAS MCF	ELECTRIC USAGE KWH	PEAK ELEC DEMAND (60 MIN)	AUXILIARY FUEL USAGE
** JAN **					
1	453.	25.	60597.	172.	0.
2	0.	0.	161012.	442.	0.
** FEB **					
1	368.	21.	55294.	175.	0.
2	0.	0.	134807.	483.	0.
** MAR **					
1	333.	16.	57926.	217.	0.
2	0.	0.	128033.	357.	0.
** APR **					
1	226.	12.	66103.	249.	0.
2	0.	0.	114332.	325.	0.
** MAY **					
1	167.	8.	69974.	274.	0.
2	0.	0.	105670.	287.	0.
** JUN **					
1	11.	1.	81152.	323.	0.
2	0.	0.	88045.	321.	0.
** JUL **					
1	11.	0.	93371.	322.	0.
2	0.	0.	99723.	319.	0.
** AUG **					
1	11.	0.	87388.	305.	0.
2	0.	0.	93979.	313.	0.
** SEP **					
1	11.	1.	73641.	315.	0.
2	0.	0.	81811.	318.	0.
** OCT **					
1	192.	10.	70981.	277.	0.
2	0.	0.	109218.	289.	0.
** NOV **					
1	330.	19.	57488.	220.	0.
2	0.	0.	127872.	407.	0.
** DEC **					
1	444.	22.	58365.	193.	0.
2	0.	0.	157013.	481.	0.
** ANN **					
1	2557.	25.	832280.	323.	0.
2	0.	0.	1401514.	483.	0.

TABLE 11-75

OUTPUT SUMMARY

CONVENTIONAL HEATING AND COOLING

SYSTEM 1 RECIP CHILLER WITH GAS BOILER
SYSTEM 2 CALIFORNIA HEAT PUMP SYSTEM

UNIT VALUES OF ANNUAL UTILITY CONSUMPTION

SYS	GAS USAGE MCF/SQFT	ELEC USAGE KWH/SQFT	ELEC DMD WATTS/SQFT	AUX FUEL UNITS/SQFT
1	0.0435	14.15	5.493	0.0
2	0.0	23.84	8.221	0.0

PEAK BOILER REQUIREMENTS FOR THE YEAR (MBH)

SYS	RECOV HEAT BOILER LOAD	SUPPLEMENTAL BOILER LOAD	COMBINED BOILER LOAD
1	0.	1716.	1716.
2	452.	1323.	1718.

ANNUAL EQUIVALENT ENERGY CONSUMPTION (WITHOUT CONVERSION OR DISTRIBUTION LOSSES BY ENERGY TYPE)

SYS	BTU/SQ FT/YR
1	92658.
2	81350.

TABLE 11-76

EQUIPMENT OPERATING HOURS

CONVENTIONAL HEATING AND COOLING

SYSTEM 1 RECIP CHILLER WITH GAS BOILER
SYSTEM 2 CALIFORNIA HEAT PUMP SYSTEM

SYS	CHILLER OPERATING HOURS NO. 1	2	3	4	5	6	7	8	BOILER OPERATING HOURS NO. 1	2	3	4	5	6	7	8
** JAN **																
1	0								744							
2	170								744	586						
** FEB **																
1	0								672							
2	181								672	497						
** MAR **																
1	10								741							
2	212								741	532						
** APR **																
1	95								681							
2	294								681	389						
** MAY **																
1	156								686							
2	325								686	366						
** JUN **																
1	285								270							
2	311								270	40						
** JUL **																
1	330								288							
2	334								288	44						
** AUG **																
1	321								294							
2	336								294	45						
** SEP **																
1	223								276							
2	267								276	54						
** OCT **																
1	113								692							
2	286								692	408						
** NOV **																
1	23								717							
2	191								717	530						
** DEC **																
1	2								744							
2	162								744	594						
** ANN **																
1	1558								6805							
2	3069								6805	4085						
** ANN FULL LOAD HOURS **																
1	804								1969							
2	1413								844	1576						

TABLE 11-77

THERMAL MATCHING INFORMATION

CONVENTIONAL HEATING AND COOLING

SYSTEM 1 RECIP CHILLER WITH GAS BOILER
SYSTEM 2 CALIFORNIA HEAT PUMP SYSTEM

SYS	THERMAL ENERGY REQ,MBTU (1)	SUPLMTL ENERGY SUPLD,MBTU (2)	RECOVRBL HEAT AVAIL MBTU	RECOVRBL HEAT USED MBTU
** JAN **				
1	347631.	461801.	0.	0.
2	427974.	333317.	108974.	53687.
** FEB **				
1	274648.	374928.	0.	0.
2	361679.	263400.	116828.	48383.
** MAR **				
1	239163.	340781.	0.	0.
2	356267.	235140.	165824.	48278.
** APR **				
1	191329.	242240.	0.	0.
2	329253.	175654.	252570.	37879.
** MAY **				
1	172931.	190539.	0.	0.
2	310289.	144920.	298862.	26670.
** JUN **				
1	267247.	79769.	0.	0.
2	333336.	107246.	409603.	3333.
** JUL **				
1	341221.	99931.	0.	0.
2	367492.	129963.	497332.	3421.
** AUG **				
1	294181.	85917.	0.	0.
2	313516.	110833.	423289.	3438.
** SEP **				
1	172909.	54566.	0.	0.
2	231237.	81773.	310425.	3368.
** OCT **				
1	174552.	211575.	0.	0.
2	292539.	149365.	245389.	30124.
** NOV **				
1	245974.	339255.	0.	0.
2	328364.	236033.	127108.	37707.
** DEC **				
1	343453.	453137.	0.	0.
2	413367.	327450.	100020.	46364.
** ANN **				
1	3062350.	2934484.	0.	0.
2	4034889.	2295101.	3058220.	339652.

(1) ENERGY REQUIREMENT WHICH COULD BE MET BY STEAM IF DESIRED
(2) BTU EQUIVALENT OF INPUT ENERGY USED TO MEET (1) REGARDLESS OF METHOD

TABLE 11-78

HOURS THAT LOADS EXCEED EQUIPMENT CAPACITY

		COOLING			HEATING			ELECTRICAL		
SYS	MO	HOURS	MAXIMUM	AT HR	HOURS	MAXIMUM BTU/H	AT HR	HOURS	MAXIMUM	AT HR
1	JAN	0	0.	0	53	4583896.	655	0	0.	0
1	FEB	0	0.	0	34	2905181.	824	0	0.	0
1	MAR	0	0.	0	5	1368579.	1831	0	0.	0
1	APR	0	0.	0	2	1045171.	2334	0	0.	0
1	NOV	0	0.	0	18	1752608.	7951	0	0.	0
1	DEC	0	0.	0	37	3419366.	8383	0	0.	0
2	JAN	0	0.	0	60	3974455.	656	0	0.	0
2	FEB	0	0.	0	40	2643544.	824	0	0.	0
2	MAR	0	0.	0	6	1111286.	1831	0	0.	0
2	APR	0	0.	0	2	809597.	2335	0	0.	0
2	NOV	0	0.	0	20	1391584.	7951	0	0.	0
2	DEC	0	0.	0	43	3194477.	8383	0	0.	0

OUTPUT FILE FOR MUC PROGRAM

CONVENTIONAL HEATING AND COOLING

SYS	MO	GAS DEMAND MCF	GAS CONSUMP MCF	ELEC DEMAND KW	ELEC CONSUMP KWH	AUX FUEL CONSUMP	AUX FUEL HOURS	COOLING DEMAND TONS	COOLING CONSUMP TON-HRS	TOT STM DEMAND MBH	TOT STM CONSUMP MBTU
SYSTEM 1 RECIP CHILLER WITH GAS BOILER											
1	1	25.	453.	172.	60597.	0.	0.	0.	0.	4584.	347644.
1	2	21.	368.	175.	55294.	0.	0.	0.	0.	2905.	274652.
1	3	16.	333.	217.	57926.	0.	0.	41.	334.	1389.	235157.
1	4	12.	226.	249.	66103.	0.	0.	82.	3872.	1045.	144966.
1	5	8.	167.	274.	69974.	0.	0.	99.	6721.	340.	92285.
1	6	1.	11.	323.	81152.	0.	0.	120.	21889.	34.	4597.
1	7	0.	11.	322.	93371.	0.	0.	120.	28043.	32.	4721.
1	8	0.	11.	305.	87388.	0.	0.	117.	24120.	32.	4747.
1	9	1.	11.	315.	73641.	0.	0.	120.	14010.	34.	4793.
1	10	10.	192.	277.	70981.	0.	0.	100.	5090.	406.	113477.
1	11	19.	330.	220.	57488.	0.	0.	60.	882.	1753.	235399.
1	12	22.	444.	193.	58365.	0.	0.	28.	45.	3419.	339924.
SYSTEM 2 CALIFORNIA HEAT PUMP SYSTEM											
2	1	0.	0.	442.	161012.	0.	0.	92.	6624.	3974.	217380.
2	2	0.	0.	483.	134807.	0.	0.	83.	7223.	2644.	163351.
2	3	0.	0.	357.	128033.	0.	0.	83.	10080.	1111.	132938.
2	4	0.	0.	325.	114332.	0.	0.	120.	15353.	810.	73807.
2	5	0.	0.	287.	105670.	0.	0.	117.	18167.	262.	44397.
2	6	0.	0.	321.	88045.	0.	0.	120.	24899.	5.	207.
2	7	0.	0.	319.	99723.	0.	0.	120.	30232.	5.	214.
2	8	0.	0.	313.	93979.	0.	0.	120.	25731.	5.	217.
2	9	0.	0.	318.	81811.	0.	0.	120.	18870.	14.	323.
2	10	0.	0.	299.	109218.	0.	0.	99.	14917.	315.	57307.
2	11	0.	0.	407.	127872.	0.	0.	94.	7727.	1392.	143756.
2	12	0.	0.	481.	157013.	0.	0.	77.	6080.	3194.	215774.
ANNUAL VALUES FOR ALL SYSTEMS (NOT INCLUDED ON OUTPUT FILE FOR MUC)											
1	ANN	25.	2557.	323.	832280.	0.	0.	120.	105004.	4584.	1802358.
2	ANN	0.	0.	483.	1401514.	0.	0.	120.	185905.	3974.	1049670.

TABLE 11-79

ENERGY USAGE BY SOURCE

CONVENTIONAL HEATING AND COOLING

SYS	MO	GAS ENGINES MCF	GAS BOILER MCF	GAS PROCESS MCF	ELECTRIC BASE KWH	ELECTRIC ACC KWH	ELECTRIC HEATING KWH	ELECTRIC COOLING KWH	ELECTRIC PROCESS KWH
SYSTEM 1 RECIP CHILLER WITH GAS BOILER									
1	1	0.	453.	0.	57611.	2567.	0.	0.	419.
1	2	0.	368.	0.	52594.	2318.	0.	0.	382.
1	3	0.	331.	0.	54390.	2879.	0.	272.	385.
1	4	0.	226.	0.	58928.	3379.	0.	3377.	419.
1	5	0.	167.	0.	59363.	4265.	0.	5928.	419.
1	6	0.	11.	0.	56876.	3679.	0.	20215.	385.
1	7	0.	11.	0.	62793.	4126.	0.	26037.	419.
1	8	0.	11.	0.	61137.	3921.	0.	21913.	422.
1	9	0.	11.	0.	57553.	2995.	0.	12696.	401.
1	10	0.	192.	0.	62409.	3663.	0.	4473.	438.
1	11	0.	330.	0.	53492.	2827.	0.	783.	385.
1	12	0.	449.	0.	55230.	2688.	0.	46.	401.
1	ANN	0.	2557.	0.	692376.	39307.	0.	95741.	4875.
SYSTEM 2 CALIFORNIA HEAT PUMP SYSTEM									
2	1	0.	0.	0.	56376.	6562.	89407.	8253.	419.
2	2	0.	0.	0.	51335.	5924.	68174.	9000.	382.
2	3	0.	0.	0.	52160.	6600.	56337.	12559.	385.
2	4	0.	0.	0.	56236.	6246.	32340.	19129.	419.
2	5	0.	0.	0.	56376.	6418.	19826.	22635.	419.
2	6	0.	0.	0.	51990.	4251.	400.	31323.	385.
2	7	0.	0.	0.	56376.	4354.	412.	37667.	419.
2	8	0.	0.	0.	56691.	4397.	414.	32060.	422.
2	9	0.	0.	0.	53941.	3514.	449.	23511.	401.
2	10	0.	0.	0.	58642.	6381.	25179.	18585.	438.
2	11	0.	0.	0.	51990.	6347.	54530.	9627.	385.
2	12	0.	0.	0.	54111.	6565.	88365.	7575.	401.
2	ANN	0.	0.	0.	656195.	68060.	440833.	231622.	4875.

TABLE 11-80

CLEVELAND

$\frac{656195 \times 3413}{10^6} = 2240$

ELECTRICAL ENERGY FACTOR	0.3440
GASEOUS ENERGY FACTOR	0.9500
BTUS PER CUBIC FOOT GAS	1020.0

BTU COUNT FOR SYSTEM NO. 1 RECIP CHILLER WITH GAS BOILER

				Source Energy
BTUS GAS CONSUMED AT SITE	2638. MMBTU		x1.11	2875
BTUS ELECTRIC CONSUMED AT SITE	2941. MMBTU	-2240 = 601	x3.04	1827
TOTAL BTUS CONSUMED AT SITE	5449. MMBTU			4722
EQUIVALENT BTUS GAS AT WELL	2745. MMBTU			
EQUIVALENT BTUS ELECTRIC AT POWER STATION	8530. MMBTU			
TOTAL EQUIVALENT BTUS IN RAW ENERGY FORM	11276. MMBTU			

BTU COUNT FOR SYSTEM NO. 2 CALIFORNIA HEAT PUMP

BTUS GAS CONSUMED AT SITE	0. MMBTU			0
BTUS ELECTRIC CONSUMED AT SITE	4783. MMBTU	-2240 = 2543	x3.04	7731
TOTAL BTUS CONSUMED AT SITE	4783. MMBTU			7731
EQUIVALENT BTUS GAS AT WELL	0. MMBTU			
EQUIVALENT BTUS ELECTRIC AT POWER STATION	14364. MMBTU			
TOTAL EQUIVALENT BTUS IN RAW ENERGY FORM	14364. MMBTU			

BTU COUNT FOR SYSTEM NO. 3 DOUBLE CONDENSER

BTUS GAS CONSUMED AT SITE	0. MMBTU			0
BTUS ELECTRIC CONSUMED AT SITE	4419. MMBTU	-2240 = 2179	x3.04	6624
TOTAL BTUS CONSUMED AT SITE	4419. MMBTU			6624
EQUIVALENT BTUS GAS AT WELL	0. MMBTU			
EQUIVALENT BTUS ELECTRIC AT POWER STATION	13270. MMBTU			
TOTAL EQUIVALENT BTUS IN RAW ENERGY FORM	13270. MMBTU			

BTU COUNT FOR SYSTEM NO. 4 MECH GAS HEAT PUMP

BTUS GAS CONSUMED AT SITE	6151. MMBTU		x1.11	6828
BTUS ELECTRIC CONSUMED AT SITE	1850. MMBTU	-2240 = -390	x3.04	-1186
TOTAL BTUS CONSUMED AT SITE	8001. MMBTU			5642
EQUIVALENT BTUS GAS AT WELL	6475. MMBTU			
EQUIVALENT BTUS ELECTRIC AT POWER STATION	5555. MMBTU			
TOTAL EQUIVALENT BTUS IN RAW ENERGY FORM	12030. MMBTU			

BTU COUNT FOR SYSTEM NO. 5 ELEC GAS HEAT PUMP

BTUS GAS CONSUMED AT SITE	6124. MMBTU		x1.11	6798
BTUS ELECTRIC CONSUMED AT SITE	1696. MMBTU	-2240 = -544	x3.04	-1654
TOTAL BTUS CONSUMED AT SITE	7820. MMBTU			5144
EQUIVALENT BTUS GAS AT WELL	6447. MMBTU			
EQUIVALENT BTUS ELECTRIC AT POWER STATION	5093. MMBTU			
TOTAL EQUIVALENT BTUS IN RAW ENERGY FORM	11539. MMBTU			

TABLE 11-81

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MONTHLY  AND  ANNUAL  UTILITY  COST  FOR

  CLEVELAND RATES  PRESENT

    NO SYSTEM/RATE COMBINATIONS      5
    INPUT KEY                        1
    NO SYSTEMS ON FILE/CARDS         5
    GROUP KEY                        C
    NO REPLACEMENT/ADDIT CARDS       0
    NO GAS RATES                     1
    NO ELECTRIC RATES                2
    NO AUXILIARY FUEL RATES          0
    NO CHILLED WATER RATES           0
    NO STEAM OR HOT WATER RATES      0
    FLOOR AREA, SQFT                 0.

GAS RATE C1
      MR $        FC $        FAR     NBA MDACF XPCT MONTHS        AV MO   PAP  RFPG APPL
MD    4.           0.       32.10    0.0     0.   0.  0  0   0  0   0  0    0.   0.0    0                  EDG GEN SERVICE PUCO  500
DR          0.     0.0          0.     0.0          0.     0.0          0.     0.0          0.     0.0          0.     0.0          0.     0.0
CR       1.  0   413.0       4.  0   218.0       1.  0   205.0       0.  0     0.0       0.  0     0.0       0.  0     0.0       0.  0     0.0

ELECTRIC RATE 2S
        $  $/KW KH/KW PD     FAR     NBA  MDKW MPCT MONTHS        AV MO   PPD   CDC C/KWH  SB
MD   10.  0.0      0.  0    1.61    0.0     0.   0.  0  0   0  0   0  0    0.    0.  0.0   0                 LARGE COMM. 30 KW OR MORE
DR        50.    3.76          1.    2.70          0.    0.0          0.    0.0          0.    0.0          0.    0.0          0.    0.0
CR   40000.       2.39   60000.      1.88       1.       1.28       0.       0.0       0.       0.0       0.       0.0       0.       0.0

ELECTRIC RATE 2W
        $  $/KW KH/KW PD     FAR     NBA  MDKW MPCT MONTHS        AV MO   PPD   CDC C/KWH  SB
MD   10.  0.0      0.  0    1.61    0.0     0.   0.  0  0   0  0   0  0    0.    0.  0.0   0                 LARGE COMM. 30 KW OR MORE
DR        50.    3.61          1.    2.55          0.    0.0          0.    0.0          0.    0.0          0.    0.0          0.    0.0
CR   40000.       2.14   60000.      1.63       1.       1.18       0.       0.0       0.       0.0       0.       0.0       0.       0.0

SYSTEM/RATE SCHEDULE MATCHING     GAS RATES      ELEC RATES     AF RATES       CW RATES       STM RATES      PCDI  C/KVA  KWRED
                                  RT MO-MO RT    RT MO-MO RT    RT MO-MO RT    RT MO-MO RT    RT MO-MO RT
A1   RECIP CHILLER GAS BOILER     C1  1 12       2S  6  9 2W     0  0           0  0           0  0           0.0    0.0    0.
B1   CALIFORNIA HEAT PUMP           0  0        2S  6  9 2W     0  0           0  0           0  0           0.0    0.0    0.
C1   DOUBLE CONDENSER               0  0        2S  6  9 2W     0  0           0  0           0  0           0.0    0.0    0.
D1   MECH GAS HEAT PUMP            C1  1 12       2S  6  9 2W     0  0           0  0           0  0           0.0    0.0    0.
E1   ELEC GAS HEAT PUMP            C1  1 12       2S  6  9 2W     0  0           0  0           0  0           0.0    0.0    0.
```

TABLE 11-82

MONTHLY DEMAND AND CONSUMPTION VALUES

	GDEM	GCON	FDEM	ECON	ACON	AHRS	CDEM	CCON	HDEM	HCON
A1 1	1.	455.	172.	60597.	0.	0.	0.	0.	0.	0.
A1 2	1.	368.	175.	55294.	0.	0.	0.	0.	0.	0.
A1 3	1.	331.	217.	57926.	0.	0.	0.	0.	0.	0.
A1 4	1.	226.	249.	66103.	0.	0.	0.	0.	0.	0.
A1 5	0.	167.	274.	69974.	0.	0.	0.	0.	0.	0.
A1 6	0.	11.	323.	81152.	0.	0.	0.	0.	0.	0.
A1 7	0.	11.	322.	93371.	0.	0.	0.	0.	0.	0.
A1 8	0.	11.	305.	87388.	0.	0.	0.	0.	0.	0.
A1 9	0.	11.	315.	73641.	0.	0.	0.	0.	0.	0.
A1 10	1.	192.	277.	70981.	0.	0.	0.	0.	0.	0.
A1 11	1.	330.	220.	57488.	0.	0.	0.	0.	0.	0.
A1 12	1.	444.	193.	58254.	0.	0.	0.	0.	0.	0.
B1 1	0.	0.	442.	161312.	0.	0.	0.	0.	0.	0.
B1 2	0.	0.	483.	134807.	0.	0.	0.	0.	0.	0.
B1 3	0.	0.	357.	128033.	0.	0.	0.	0.	0.	0.
B1 4	0.	0.	325.	114332.	0.	0.	0.	0.	0.	0.
B1 5	0.	0.	287.	105670.	0.	0.	0.	0.	0.	0.
B1 6	0.	0.	321.	88045.	0.	0.	0.	0.	0.	0.
B1 7	0.	0.	319.	99723.	0.	0.	0.	0.	0.	0.
B1 8	0.	0.	313.	93979.	0.	0.	0.	0.	0.	0.
B1 9	0.	0.	318.	81811.	0.	0.	0.	0.	0.	0.
B1 10	0.	0.	289.	109218.	0.	0.	0.	0.	0.	0.
B1 11	0.	0.	407.	127872.	0.	0.	0.	0.	0.	0.
B1 12	0.	0.	481.	156766.	0.	0.	0.	0.	0.	0.
C1 1	0.	0.	519.	146739.	0.	0.	0.	0.	0.	0.
C1 2	0.	0.	520.	121310.	0.	0.	0.	0.	0.	0.
C1 3	0.	0.	379.	111386.	0.	0.	0.	0.	0.	0.
C1 4	0.	0.	361.	100831.	0.	0.	0.	0.	0.	0.
C1 5	0.	0.	349.	97424.	0.	0.	0.	0.	0.	0.
C1 6	0.	0.	331.	86024.	0.	0.	0.	0.	0.	0.
C1 7	0.	0.	332.	97851.	0.	0.	0.	0.	0.	0.
C1 8	0.	0.	312.	91037.	0.	0.	0.	0.	0.	0.
C1 9	0.	0.	322.	80033.	0.	0.	0.	0.	0.	0.
C1 10	0.	0.	314.	100626.	0.	0.	0.	0.	0.	0.
C1 11	0.	0.	444.	114743.	0.	0.	0.	0.	0.	0.
C1 12	0.	0.	477.	146592.	0.	0.	0.	0.	0.	0.
D1 1	2.	677.	138.	33742.	0.	0.	0.	0.	0.	0.
D1 2	2.	596.	139.	31563.	0.	0.	0.	0.	0.	0.
D1 3	2.	632.	154.	32098.	0.	0.	0.	0.	0.	0.
D1 4	1.	577.	178.	40142.	0.	0.	0.	0.	0.	0.
D1 5	1.	576.	201.	42456.	0.	0.	0.	0.	0.	0.
D1 6	1.	271.	262.	61258.	0.	0.	0.	0.	0.	0.
D1 7	1.	289.	256.	71404.	0.	0.	0.	0.	0.	0.
D1 8	1.	294.	241.	65403.	0.	0.	0.	0.	0.	0.
D1 9	1.	246.	250.	55949.	0.	0.	0.	0.	0.	0.
D1 10	1.	585.	207.	44289.	0.	0.	0.	0.	0.	0.
D1 11	2.	619.	156.	32392.	0.	0.	0.	0.	0.	0.
D1 12	2.	668.	138.	31563.	0.	0.	0.	0.	0.	0.
E1 1	2.	677.	130.	28015.	0.	0.	0.	0.	0.	0.
E1 2	2.	596.	131.	26389.	0.	0.	0.	0.	0.	0.
E1 3	2.	632.	149.	26428.	0.	0.	0.	0.	0.	0.
E1 4	1.	575.	178.	35190.	0.	0.	0.	0.	0.	0.
E1 5	1.	574.	201.	37756.	0.	0.	0.	0.	0.	0.
E1 6	1.	265.	261.	60524.	0.	0.	0.	0.	0.	0.
E1 7	1.	284.	256.	70986.	0.	0.	0.	0.	0.	0.
E1 8	1.	289.	241.	64818.	0.	0.	0.	0.	0.	0.
E1 9	1.	241.	250.	54862.	0.	0.	0.	0.	0.	0.
E1 10	1.	583.	207.	39383.	0.	0.	0.	0.	0.	0.
E1 11	2.	619.	154.	26664.	0.	0.	0.	0.	0.	0.
E1 12	2.	668.	132.	25853.	0.	0.	0.	0.	0.	0.

TABLE 11-83

MONTHLY AND ANNUAL UTILITY COST FOR

CLEVELAND RATES PRESENT

	ELECTRIC COST, $	AVER RATE C/KWH	UNIT COST C/SQFT	GAS COST, $	AVER RATE C/MCF	UNIT COST C/SQFT
SYSTEM A1 RECIP CHILLER GAS BOILER						
JAN	2661.	4.391	0.0	1077.	237.67	0.0
FEB	2496.	4.515	0.0	875.	237.81	0.0
MAR	2589.	4.642	0.0	792.	237.88	0.0
APR	3336.	4.592	0.0	538.	238.25	0.0
MAY	3229.	4.609	0.0	399.	238.66	0.0
JUN	3964.	4.884	0.0	29.	260.74	0.0
JUL	4384.	4.699	0.0	29.	260.74	0.0
AUG	4133.	4.729	0.0	29.	260.74	0.0
SEP	3698.	4.957	0.0	29.	260.74	0.0
OCT	3265.	4.600	0.0	458.	238.45	0.0
NOV	2682.	4.606	0.0	785.	237.89	0.0
DEC	2638.	4.529	0.0	1055.	237.69	0.0
ANN	38857.	4.659	0.0	6094.	238.52	0.0
SYSTEM B1 CALIFORNIA HEAT PUMP						
JAN	6331.	3.932	0.0			
FEB	5704.	4.231	0.0			
MAR	5193.	4.056	0.0			
APR	4729.	4.136	0.0			
MAY	4390.	4.155	0.0			
JUN	4199.	4.769	0.0			
JUL	4672.	4.614	0.0			
AUG	4385.	4.666	0.0			
SEP	3973.	4.857	0.0			
OCT	4494.	4.115	0.0			
NOV	5316.	4.158	0.0			
DEC	6312.	4.026	0.0			
ANN	59629.	4.255	0.0			
SYSTEM C1 DOUBLE CONDENSER						
JAN	6129.	4.177	0.0			
FEB	5421.	4.469	0.0			
MAR	4784.	4.295	0.0			
APR	4444.	4.407	0.0			
MAY	4306.	4.420	0.0			
JUN	4156.	4.831	0.0			
JUL	4571.	4.672	0.0			
AUG	4279.	4.701	0.0			
SEP	3922.	4.900	0.0			
OCT	4318.	4.292	0.0			
NOV	5044.	4.396	0.0			
DEC	6918.	4.105	0.0			
ANN	57392.	4.411	0.0			

TABLE 11-84

MONTHLY AND ANNUAL UTILITY COST FOR

CLEVELAND RATES PRESENT

	ELECTRIC COST, $	AVER RATE C/KWH	UNIT COST C/SQFT	GAS COST, $	AVER RATE C/MCF	UNIT COST C/SQFT
SYSTEM D1	MECH GAS HEAT PUMP					
JAN	1671.	4.953	0.0	1608.	237.48	0.0
FEB	1592.	5.044	0.0	1416.	237.54	0.0
MAR	1650.	5.142	0.0	1501.	237.51	0.0
APR	2013.	5.014	0.0	1371.	237.55	0.0
MAY	2146.	5.056	0.0	1368.	237.55	0.0
JUN	3104.	5.067	0.0	645.	238.06	0.0
JUL	3442.	4.821	0.0	688.	238.00	0.0
AUG	3197.	4.881	0.0	700.	237.98	0.0
SEP	2686.	5.159	0.0	586.	238.16	0.0
OCT	2221.	5.015	0.0	1390.	237.54	0.0
NOV	1655.	5.158	0.0	1470.	237.52	0.0
DEC	1589.	5.036	0.0	1586.	237.49	0.0
ANN	27164.	5.012	0.0	14328.	237.62	0.0
SYSTEM E1	ELEC GAS HEAT PUMP					
JAN	1536.	5.125	0.0	1608.	237.48	0.0
FEB	1377.	5.220	0.0	1416.	237.54	0.0
MAR	1425.	5.391	0.0	1501.	237.51	0.0
APR	1828.	5.193	0.0	1366.	237.55	0.0
MAY	1983.	5.251	0.0	1364.	237.55	0.0
JUN	3076.	5.062	0.0	631.	238.09	0.0
JUL	3428.	4.829	0.0	676.	238.02	0.0
AUG	3172.	4.893	0.0	688.	238.00	0.0
SEP	2348.	5.192	0.0	574.	238.18	0.0
OCT	2059.	5.228	0.0	1385.	237.55	0.0
NOV	1446.	5.425	0.0	1470.	237.52	0.0
DEC	1360.	5.260	0.0	1586.	237.49	0.0
ANN	25437.	5.119	0.0	14264.	237.62	0.0

TOTAL UTILITY COST

NO	NAME	$
A1	RECIP CHILLER GAS BOILER	44950.
B1	CALIFORNIA HEAT PUMP	59629.
C1	DOUBLE CONDENSER	57392.
D1	MECH GAS HEAT PUMP	41492.
E1	ELEC GAS HEAT PUMP	39701.

TABLE 11-85

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INVESTMENT ANALYSIS

FOR CLE MUC7 G1A7 B1 B2 B3 B4 B5

CONSIDERING THE FOLLOWING ALTERNATIVES

     1 - B-1
     2 - B-2
     3 - B-3
     4 - B-4
     5 - B-5
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TABLE 11-86

INVESTMENT ANALYSIS FOR CLE MUC7 GIA7 B1 B2 B3 B4 B5 — DATE 4/2'/79

* SUMMARY OF ASSUMPTIONS *

ALTERNATIVE - L - B-L

STARTING DATE OF ANALYSIS - 1/ 1/85 — LENGTH OF STUDY - 20 YEARS

	INV 1	INV 2	INV 3
YEAR OF INVESTMENT	1985	0	0
- FINANCING -			
DEBT	75.0	0.0	0.0
LEASED	0.0	0.0	0.0
TOTAL	75.0	0.0	0.0
COST OF DEBT	10.0	0.0	0.0
ANNUAL LEASING PMT-$/YR	0.	0.	0.
- DEPRECIATION -			
TOTAL INVESTMENT	235065.	0.	0.
LESS SALVAGE	0.	0.	0.
DEPRECIATION BASE	235065.	0.	0.
BOOK METHOD - STL			
BOOK LIFE	20 YRS	0 YRS	0 YRS
TAX METHOD -- DDB			
TAX LIFE	20 YRS	0 YRS	0 YRS

- TAXES AND INSURANCE -

PROPERTY TAX RATE -- 1.00 /YR ON NON-LEASED INVS

INSURANCE RATE -- 1.00 /YR ON INVESTMENT

FEDERAL INCOME TAX RATE -- 46.00

STATE/LOCAL INCOME TAX RATE -- 0.0

- INFLATION RATES -

PROPERTY TAX -- 0.0

FEDERAL TAX -- 0.0

STATE/LOCAL -- 0.0

LABOR -- 0.0 NATURAL GAS -- 0.0

MAINTENANCE -- 0.0 COAL -- 0.0

ELECTRICITY -- 0.0 OIL -- 0.0

- STARTING COST FIGURES - DOLLARS/YEAR

YEAR OF DATA 1985

LABOR -- 0.

MAINTENANCE -- 500.

MISC EXPENSE -- 0.

FUELS- NATURAL GAS -- 6094.

COAL -- 0.

OIL -- 0.

ELECTRICITY -- 38857.

TABLE 11-87

INVESTMENT ANALYSIS FOR CLE MUCF GIAF B1 B2 B3 B4 B5 DATE 4/23/79

* SUMMARY OF ASSUMPTIONS *

ALTERNATIVE - 2 - B-2

STARTING DATE OF ANALYSIS - 1/ 1/85

LENGTH OF STUDY - 20 YEARS

	INV 1	INV 2	INV 3
YEAR OF INVESTMENT	1985	0	0
- FINANCING -			
DEBT	75.0	0.0	0.0
LEASED	0.0	0.0	0.0
TOTAL	75.0	0.0	0.0
COST OF DEBT	10.0	0.0	0.0
ANNUAL LEASING PMT-$/YR	0.	0.	0.
- DEPRECIATION -			
TOTAL INVESTMENT	315500.	0.	0.
LESS SALVAGE	0.	0.	0.
DEPRECIATION BASE	315500.	0.	0.
BOOK METHOD - STL			
BOOK LIFE	20 YRS	0 YRS	0 YRS
TAX METHOD -- DDB			
TAX LIFE	20 YRS	0 YRS	0 YRS

- TAXES AND INSURANCE -

PROPERTY TAX RATE -- 1.00 /YR ON NON-LEASED INVS

INSURANCE RATE -- 1.00 /YR ON INVESTMENT

FEDERAL INCOME TAX RATE -- 46.00

STATE/LOCAL INCOME TAX RATE -- 0.0

- INFLATION RATES -

PROPERTY TAX -- 0.0

FEDERAL TAX -- 0.0

STATE/LOCAL -- 0.0

LABOR -- 0.0 NATURAL GAS -- 0.0

MAINTENANCE -- 0.0 COAL -- 0.0

ELECTRICITY -- 0.0 OIL -- 0.0

- STARTING COST FIGURES - DOLLARS/YEAR

YEAR OF DATA 1985

LABOR	--	0.
MAINTENANCE	--	7300.
MISC EXPENSE	--	0.

FUELS- NATURAL GAS	--	0.
COAL	--	0.
OIL	--	0.
ELECTRICITY	--	59629.

TABLE 11-88

INVESTMENT ANALYSIS FOR CLE MUC7 G1A7 B1 B2 B3 B4 B5 DATE 4/20/79

* SUMMARY OF ASSUMPTIONS *

ALTERNATIVE - 3 - B-3

STARTING DATE OF ANALYSIS - 1/ 1/85

LENGTH OF STUDY - 20 YEARS

	INV 1	INV 2	INV 3
YEAR OF INVESTMENT	1985	0	0
- FINANCING -			
DEBT	75.0	0.0	0.0
LEASED	0.0	0.0	0.0
TOTAL	75.0	0.0	0.0
COST OF DEBT	10.0	0.0	0.0
ANNUAL LEASING PMT-$/YR	0.	0.	0.
- DEPRECIATION -			
TOTAL INVESTMENT	259000.	0.	0.
LESS SALVAGE	0.	0.	0.
DEPRECIATION BASE	259000.	0.	0.
BOOK METHOD - STL			
BOOK LIFE	20 YRS	0 YRS	0 YRS
TAX METHOD -- DDB			
TAX LIFE	20 YRS	0 YRS	0 YRS

- TAXES AND INSURANCE -

PROPERTY TAX RATE -- 1.00 /YR ON NON-LEASED INVS

INSURANCE RATE -- 1.00 /YR ON INVESTMENT

FEDERAL INCOME TAX RATE -- 46.00

STATE/LOCAL INCOME TAX RATE -- 0.0

- INFLATION RATES -

PROPERTY TAX -- 0.0

FEDERAL TAX -- 0.0

STATE/LOCAL -- 0.0

LABOR -- 0.0 NATURAL GAS -- 0.0

MAINTENANCE -- 0.0 COAL -- 0.0

ELECTRICITY -- 0.0 OIL -- 0.0

- STARTING COST FIGURES - DOLLARS/YEAR

YEAR OF DATA 1985

LABOR -- 0.

MAINTENANCE -- 6300.

MISC EXPENSE -- 0.

FUELS- NATURAL GAS -- 0.

COAL -- 0.

OIL -- 0.

ELECTRICITY -- 57392.

TABLE 11-89

INVESTMENT ANALYSIS FOR CLE MOCZ GEAZ 81 82 83 84 85 DATE 4/20/79

* SUMMARY OF ASSUMPTIONS *

ALTERNATIVE - 4 - B-4

STARTING DATE OF ANALYSIS - 1/ 1/85

LENGTH OF STUDY - 20 YEARS

	INV 1	INV 2	INV 3
YEAR OF INVESTMENT	1985	0	0
- FINANCING -			
DEBT	75.0	0.0	0.0
LEASED	0.0	0.0	0.0
TOTAL	75.0	0.0	0.0
COST OF DEBT	10.0	0.0	0.0
ANNUAL LEASING PMT-$/YR	0.	0.	0.
- DEPRECIATION -			
TOTAL INVESTMENT	330041.	0.	0.
LESS SALVAGE	0.	0.	0.
DEPRECIATION BASE	330041.	0.	0.
BOOK METHOD - STL			
BOOK LIFE	20 YRS	0 YRS	0 YRS
TAX METHOD -- DDB			
TAX LIFE	20 YRS	0 YRS	0 YRS

- TAXES AND INSURANCE -

PROPERTY TAX RATE -- 1.00 /YR ON NON-LEASED INVS

INSURANCE RATE -- 1.00 /YR ON INVESTMENT

FEDERAL INCOME TAX RATE -- 46.00

STATE/LOCAL INCOME TAX RATE -- 0.0

- INFLATION RATES -

PROPERTY TAX -- 0.0

FEDERAL TAX -- 0.0

STATE/LOCAL -- 0.0

LABOR -- 0.0 NATURAL GAS -- 0.0

MAINTENANCE -- 0.0 COAL -- 0.0

ELECTRICITY -- 0.0 OIL -- 0.0

- STARTING COST FIGURES - DOLLARS/YEAR

YEAR OF DATA 1985

LABOR -- 0.

MAINTENANCE -- 7300.

MISC EXPENSE -- 0.

FUELS- NATURAL GAS -- 14328.

COAL -- 0.

OIL -- 0.

ELECTRICITY -- 27164.

TABLE 11-90

INVESTMENT ANALYSIS FOR CLE MUC7 GIA7 B1 B2 B3 B4 B5 — DATE 4/23/79

* SUMMARY OF ASSUMPTIONS *

ALTERNATIVE - 5 - B-5

STARTING DATE OF ANALYSIS - 1/ 1/85

LENGTH OF STUDY - 20 YEARS

	INV 1	INV 2	INV 3
YEAR OF INVESTMENT	1985	0	0
- FINANCING -			
DEBT	75.0	0.0	0.0
LEASED	0.0	0.0	0.0
TOTAL	75.0	0.0	0.0
COST OF DEBT	10.0	0.0	0.0
ANNUAL LEASING PMT-$/YR	0.	0.	0.
- DEPRECIATION -			
TOTAL INVESTMENT	330041.	0.	0.
LESS SALVAGE	0.	0.	0.
DEPRECIATION BASE	330041.	0.	0.
BOOK METHOD - STL			
BOOK LIFE	20 YRS	0 YRS	0 YRS
TAX METHOD -- DDB			
TAX LIFE	20 YRS	0 YRS	0 YRS

- TAXES AND INSURANCE -

PROPERTY TAX RATE -- 1.00 /YR ON NON-LEASED INVS

INSURANCE RATE -- 1.00 /YR ON INVESTMENT

FEDERAL INCOME TAX RATE -- 46.00

STATE/LOCAL INCOME TAX RATE -- 0.0

- INFLATION RATES -

PROPERTY TAX -- 0.0

FEDERAL TAX -- 0.0

STATE/LOCAL -- 0.0

LABOR -- 0.0 NATURAL GAS -- 0.0

MAINTENANCE -- 0.0 COAL -- 0.0

ELECTRICITY -- 0.0 OIL -- 0.0

- STARTING COST FIGURES - DOLLARS/YEAR

YEAR OF DATA 1985

LABOR -- 0.

MAINTENANCE -- 7300.

MISC EXPENSE -- 0.

FUELS- NATURAL GAS -- 14264.

COAL -- 0.

OIL -- 0.

ELECTRICITY -- 25437.

TABLE 11-91

INVESTMENT ANALYSIS FOR CLE MUCF GIA7 B1 B2 B3 B4 B5 — DATE 4/20/79

ALTERNATIVE - 1 - B-1

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
- INVESTMENT -										
CAPITAL REQUIRED	235065	0	0	0	0	0	0	0	0	0
SALVAGE VALUE	0	0	0	0	0	0	0	0	0	0
DEPRECIABLE AMOUNT	235065	0	0	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	3078	3336	3725	4097	4507	4957	5453	5998	6598	7258
OUTSTANDING CAPITAL	173221	169885	166110	162013	157506	152549	147096	141097	134499	127243
- BOOK EXPENSES -										
BOOK DEPRECIATION	11753	11753	11753	11753	11753	11753	11753	11753	11753	11753
DEBT INTEREST	17630	17322	16983	16611	16201	15751	15255	14710	14110	13453
STATE/LOCAL PROP. TAXES	2351	2351	2351	2351	2351	2351	2351	2351	2351	2351
INSURANCE	2351	2351	2351	2351	2351	2351	2351	2351	2351	2351
SUB TOTAL	34084	33777	33438	33066	32656	32205	31709	31164	30564	29904
FUEL	6094	6094	6094	6094	6094	6094	6094	6094	6094	6094
MAINTENANCE	6500	6500	6500	6500	6500	6500	6500	6500	6500	6500
ELECTRICAL POWER	38857	38857	38857	38857	38857	38857	38857	38857	38857	38857
TOTAL BOOK EXPENSES	85535	85228	84889	84517	84107	83656	83160	82615	82015	81355
NET BOOK EXPENSES	85535	85228	84889	84517	84107	83656	83160	82615	82015	81355
NET CASH FLOW OUT	90874	33330	34459	35507	36483	37400	38267	39092	39885	40654
PW FACTOR AT 15.0	0.8696	0.7561	0.6575	0.5718	0.4972	0.4323	0.3759	0.3269	0.2843	0.2472
PW OF NET CASH FLOW OUT	79021	25203	22658	20301	18139	16169	14386	12779	11338	10049

TABLE 11-92

INVESTMENT ANALYSIS FOR CLE MUC7 G1A7 B1 B2 B3 B4 B5 DATE 4/20/79

ALTERNATIVE - 1 - B-1

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
- INVESTMENT -										
CAPITAL REQUIRED	0	0	0	0	0	0	0	0	0	0
SALVAGE VALUE	0	0	0	0	0	0	0	0	0	0
DEPRECIABLE AMOUNT	0	0	0	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	7984	8782	9661	10627	11689	12858	14144	15559	17114	18826
OUTSTANDING CAPITAL	119256	110474	101813	91187	78497	65639	51495	35936	18822	-3
- BOOK EXPENSES -										
BOOK DEPRECIATION	11753	11753	11753	11753	11753	11753	11753	11753	11753	11753
DEBT INTEREST	12724	11926	11047	10081	9019	7850	6564	5149	3594	1882
STATE/LOCAL PROP. TAXES	2351	2351	2351	2351	2351	2351	2351	2351	2351	2351
INSURANCE	2351	2351	2351	2351	2351	2351	2351	2351	2351	2351
SUB TOTAL	29179	28380	27502	26536	25473	24304	23018	21604	20048	18337
FUEL	6094	6094	6094	6094	6094	6094	6094	6094	6094	6094
MAINTENANCE	6500	6500	6500	6500	6500	6500	6500	6500	6500	6500
ELECTRICAL POWER	38857	38857	38857	38857	38857	38857	38857	38857	38857	38857
TOTAL BOOK EXPENSES	80630	79831	78953	77987	76924	75755	74469	73055	71499	69788
NET BOOK EXPENSES	80630	79831	78953	77987	76924	75755	74469	73055	71499	69788
NET CASH FLOW OUT	41437	41774	42178	42623	43111	43649	44241	44891	45607	46394
PW FACTOR AT 15.0	0.2149	0.1869	0.1625	0.1413	0.1229	0.1069	0.0929	0.0808	0.0703	0.0611
PW OF NET CASH FLOW OUT	8900	7808	6855	6024	5298	4665	4111	3627	3205	2835
TOTAL PRESENT WORTH OF NET CASH FLOW OUT	283370									

TABLE 11-93

INVESTMENT ANALYSIS FOR CLE MUC7 G1A7 B1 B2 B3 B4 B5 DATE 4/23/79

ALTERNATIVE - 2 - B-2

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
- INVESTMENT -										
CAPITAL REQUIRED	315500	0	0	0	0	0	0	0	0	0
SALVAGE VALUE	0	0	0	0	0	0	0	0	0	0
DEPRECIABLE AMOUNT	315500	0	0	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	4131	4545	4999	5499	6049	6654	7319	8051	8856	9742
OUTSTANDING CAPITAL	232494	227949	222950	217451	211402	204748	197429	189378	180522	170780
- BOOK EXPENSES -										
BOOK DEPRECIATION	15775	15775	15775	15775	15775	15775	15775	15775	15775	15775
DEBT INTEREST	23662	23249	22795	22295	21745	21140	20475	19743	18938	18052
STATE/LOCAL PROP. TAXES	3155	3155	3155	3155	3155	3155	3155	3155	3155	3155
INSURANCE	3155	3155	3155	3155	3155	3155	3155	3155	3155	3155
SUB TOTAL	45747	45334	44880	44380	43830	43225	42560	41828	41023	40137
MAINTENANCE	7300	7300	7300	7300	7300	7300	7300	7300	7300	7300
ELECTRICAL POWER	59629	59629	59629	59629	59629	59629	59629	59629	59629	59629
TOTAL BOOK EXPENSES	112676	112263	111809	111309	110759	110154	109489	108757	107952	107066
NET BOOK EXPENSES	112676	112263	111809	111309	110759	110154	109489	108757	107952	107066
NET CASH FLOW OUT	120820	43587	45102	46607	47818	49049	50212	51320	52384	53416
PW FACTOR AT 15.0	0.8696	0.7561	0.6575	0.5718	0.4972	0.4323	0.3759	0.3269	0.2843	0.2472
PW OF NET CASH FLOW OUT	105061	32958	29655	26591	23774	21205	18877	16777	14891	13204

TABLE 11-94

INVESTMENT ANALYSIS FOR CLE MUC7 G1A7 B1 B2 B3 B4 B5 DATE 4/20/79

ALTERNATIVE - 2 - B-2

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
- INVESTMENT -										
CAPITAL REQUIRED	0	0	0	0	0	0	0	0	0	0
SALVAGE VALUE	0	0	0	0	0	0	0	0	0	0
DEPRECIABLE AMOUNT	0	0	0	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	10716	11788	12966	14263	15689	17258	18984	20882	22971	25268
OUTSTANDING CAPITAL	160064	148276	135310	121047	105357	88099	69115	48233	25262	-5
- BOOK EXPENSES -										
BOOK DEPRECIATION	15775	15775	15775	15775	15775	15775	15775	15775	15775	15775
DEBT INTEREST	17078	16006	14826	13531	12115	10536	8810	6912	4823	2526
STATE/LOCAL PROP. TAXES	3155	3155	3155	3155	3155	3155	3155	3155	3155	3155
INSURANCE	3155	3155	3155	3155	3155	3155	3155	3155	3155	3155
SUB TOTAL	39163	38091	36913	35616	34190	32621	30895	28996	26908	24611
MAINTENANCE	7300	7300	7300	7300	7300	7300	7300	7300	7300	7300
ELECTRICAL POWER	59629	59629	59629	59629	59629	59629	59629	59629	59629	59629
TOTAL BOOK EXPENSES	106092	105020	103842	102545	101119	99550	97824	95925	93837	91540
NET BOOK EXPENSES	106092	105020	103842	102545	101119	99550	97824	95925	93837	91540
NET CASH FLOW OUT	54427	54920	55462	56058	56714	57436	58230	59103	60064	61121
PW FACTOR AT 15.0	0.2149	0.1869	0.1625	0.1413	0.1229	0.1069	0.0929	0.0808	0.0703	0.0611
PW OF NET CASH FLOW OUT	11699	10265	9014	7923	6970	6138	5411	4776	4220	3735
TOTAL PRESENT WORTH OF NET CASH FLOW OUT	373142									

TABLE 11-95

INVESTMENT ANALYSIS FOR CLE MUC7 G1A7 B1 B2 B3 B4 B5 DATE 4/20/79

ALTERNATIVE - 3 - B-3

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
- INVESTMENT -										
CAPITAL REQUIRED	259000	0	0	0	0	0	0	0	0	0
SALVAGE VALUE	0	0	0	0	0	0	0	0	0	0
DEPRECIABLE AMOUNT	259000	0	0	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	3392	3731	4104	4514	4966	5462	6008	6609	7270	7997
OUTSTANDING CAPITAL	190858	187128	183024	178509	173544	168082	162073	155464	148193	140196
- BOOK EXPENSES -										
BOOK DEPRECIATION	12950	12950	12950	12950	12950	12950	12950	12950	12950	12950
DEBT INTEREST	19425	19086	18713	18302	17851	17354	16808	16207	15546	14819
STATE/LOCAL PROP. TAXES	2590	2590	2590	2590	2590	2590	2590	2590	2590	2590
INSURANCE	2590	2590	2590	2590	2590	2590	2590	2590	2590	2590
SUB TOTAL	37555	37216	36843	36432	35981	35484	34938	34337	33676	32949
MAINTENANCE	6300	6300	6300	6300	6300	6300	6300	6300	6300	6300
ELECTRICAL POWER	57392	57392	57392	57392	57392	57392	57392	57392	57392	57392
TOTAL BOOK EXPENSES	101247	100908	100535	100124	99673	99176	98630	98029	97368	96641
NET BOOK EXPENSES	101247	100908	100535	100124	99673	99176	98630	98029	97368	96641
NET CASH FLOW OUT	103908	40505	41749	42993	43979	44989	45944	46854	47728	48575
PW FACTOR AT 15.0	0.8696	0.7561	0.6575	0.5718	0.4972	0.4323	0.3759	0.3269	0.2843	0.2472
PW OF NET CASH FLOW OUT	90355	30628	27451	24530	21866	19450	17272	15317	13567	12007

TABLE 11-96

INVESTMENT ANALYSIS FOR CLE MUC7 G1A7 B1 B2 B3 B4 B5 — DATE 4/20/79

ALTERNATIVE - 3 - B-3

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
- INVESTMENT -										
CAPITAL REQUIRED	0	0	0	0	0	0	0	0	0	0
SALVAGE VALUE	0	0	0	0	0	0	0	0	0	0
DEPRECIABLE AMOUNT	0	0	0	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	8797	9677	10644	11709	12880	14168	15584	17143	18857	20743
OUTSTANDING CAPITAL	131399	121723	111078	99369	86490	72322	56738	39595	20738	-4
- BOOK EXPENSES -										
BOOK DEPRECIATION	12950	12950	12950	12950	12950	12950	12950	12950	12950	12950
DEBT INTEREST	14020	13140	12172	11108	9937	8649	7232	5674	3959	2074
STATE/LOCAL PROP. TAXES	2590	2590	2590	2590	2590	2590	2590	2590	2590	2590
INSURANCE	2590	2590	2590	2590	2590	2590	2590	2590	2590	2590
SUB TOTAL	32150	31270	30302	29238	28067	26779	25362	23804	22089	20204
MAINTENANCE	6300	6300	6300	6300	6300	6300	6300	6300	6300	6300
ELECTRICAL POWER	57392	57392	57392	57392	57392	57392	57392	57392	57392	57392
TOTAL BOOK EXPENSES	95842	94962	93994	92930	91759	90471	89054	87496	85781	83896
NET BOOK EXPENSES	95842	94962	93994	92930	91759	90471	89054	87496	85781	83896
NET CASH FLOW OUT	49474	49889	50254	50744	51282	51875	52527	53243	54032	54899
PW FACTOR AT 15.0	0.2149	0.1869	0.1625	0.1413	0.1229	0.1069	0.0929	0.0808	0.0703	0.0611
PW OF NET CASH FLOW OUT	10619	9310	8168	7172	6302	5544	4881	4302	3797	3354
TOTAL PRESENT WORTH OF NET CASH FLOW OUT	335891									

TABLE 11-97

INVESTMENT ANALYSIS FOR CLE MULT GIAT B1 B2 B3 B4 B5 DATE 4/20/79

ALTERNATIVE - 4 - B-4

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
- INVESTMENT -										
CAPITAL REQUIRED	330041	0	0	0	0	0	0	0	0	0
SALVAGE VALUE	0	0	0	0	0	0	0	0	0	0
DEPRECIABLE AMOUNT	330041	0	0	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	4322	4754	5229	5752	6328	6960	7656	8422	9264	10191
OUTSTANDING CAPITAL	243209	238455	233225	227473	221145	214185	206528	198106	188842	178651
- BOOK EXPENSES -										
BOOK DEPRECIATION	16502	16502	16502	16502	16502	16502	16502	16502	16502	16502
DEBT INTEREST	24753	24321	23845	23323	22747	22115	21418	20653	19811	18884
STATE/LOCAL PROP. TAXES	3300	3300	3300	3300	3300	3300	3300	3300	3300	3300
INSURANCE	3300	3300	3300	3300	3300	3300	3300	3300	3300	3300
SUB TOTAL	47856	47424	46948	46425	45850	45217	44521	43756	42913	41987
FUEL	14328	14328	14328	14328	14328	14328	14328	14328	14328	14328
MAINTENANCE	7300	7300	7300	7300	7300	7300	7300	7300	7300	7300
ELECTRICAL POWER	27164	27164	27164	27164	27164	27164	27164	27164	27164	27164
TOTAL BOOK EXPENSES	96648	96216	95740	95217	94642	94009	93313	92548	91705	90779
NET BOOK EXPENSES	96648	96216	95740	95217	94642	94009	93313	92548	91705	90779
NET CASH FLOW OUT	114929	34136	35721	37191	38563	39850	41066	42225	43339	44419
PW FACTOR AT 15.0	0.8696	0.7561	0.6575	0.5718	0.4972	0.4323	0.3759	0.3269	0.2843	0.2472
PW OF NET CASH FLOW OUT	99938	25812	23487	21264	19172	17228	15438	13804	12320	10980

TABLE 11-98

INVESTMENT ANALYSIS FOR CLF MOC7 GIA7 B1 B2 B3 B4 B5 DATE 4/20/79

ALTERNATIVE - 4 - B-4

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
- INVESTMENT -										
CAPITAL REQUIRED	0	0	0	0	0	0	0	0	0	0
SALVAGE VALUE	0	0	0	0	0	0	0	0	0	0
DEPRECIABLE AMOUNT	0	0	0	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	11210	12331	13564	14920	16412	18054	19859	21845	24029	26432
OUTSTANDING CAPITAL	167441	155110	141546	126626	110214	92160	72301	50456	26427	-5
- BOOK EXPENSES -										
BOOK DEPRECIATION	16502	16502	16502	16502	16502	16502	16502	16502	16502	16502
DEBT INTEREST	17865	16744	15511	14155	12663	11021	9216	7230	5046	2643
STATE/LOCAL PROP. TAXES	3300	3300	3300	3300	3300	3300	3300	3300	3300	3300
INSURANCE	3300	3300	3300	3300	3300	3300	3300	3300	3300	3300
SUB TOTAL	40968	39847	38614	37257	35765	34124	32319	30333	28148	25746
FUEL	14328	14328	14328	14328	14328	14328	14328	14328	14328	14328
MAINTENANCE	7300	7300	7300	7300	7300	7300	7300	7300	7300	7300
ELECTRICAL POWER	27164	27164	27164	27164	27164	27164	27164	27164	27164	27164
TOTAL BOOK EXPENSES	89760	88639	87406	86049	84557	82916	81111	79125	76940	74538
NET BOOK EXPENSES	89760	88639	87406	86049	84557	82916	81111	79125	76940	74538
NET CASH FLOW OUT	45476	45991	46558	47182	47869	48624	49454	50368	51372	52478
PW FACTOR AT 15.0	0.2149	0.1869	0.1625	0.1413	0.1229	0.1069	0.0929	0.0808	0.0703	0.0611
PW OF NET CASH FLOW OUT	9775	8596	7567	6668	5883	5196	4596	4070	3610	3206
TOTAL PRESENT WORTH OF NET CASH FLOW OUT	318610									

TABLE 11-99

INVESTMENT ANALYSIS FOR CLE MOD7 G1A7 B1 B2 B3 B4 B5 — DATE 4/20/79

ALTERNATIVE - 5 - B-5

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
- INVESTMENT -										
CAPITAL REQUIRED	330041	0	0	0	0	0	0	0	0	0
SALVAGE VALUE	0	0	0	0	0	0	0	0	0	0
DEPRECIABLE AMOUNT	330041	0	0	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	4322	4754	5229	5752	6328	6960	7656	8422	9264	10191
OUTSTANDING CAPITAL	243209	238455	233225	227473	221145	214185	206528	198106	188842	178651
- BOOK EXPENSES -										
BOOK DEPRECIATION	16502	16502	16502	16502	16502	16502	16502	16502	16502	16502
DEBT INTEREST	24753	24321	23845	23323	22747	22115	21418	20653	19811	18884
STATE/LOCAL PROP. TAXES	3300	3300	3300	3300	3300	3300	3300	3300	3300	3300
INSURANCE	3300	3300	3300	3300	3300	3300	3300	3300	3300	3300
SUB TOTAL	47856	47424	46948	46425	45850	45217	44521	43756	42913	41987
FUEL	14264	14264	14264	14264	14264	14264	14264	14264	14264	14264
MAINTENANCE	7300	7300	7300	7300	7300	7300	7300	7300	7300	7300
ELECTRICAL POWER	25437	25437	25437	25437	25437	25437	25437	25437	25437	25437
TOTAL BOOK EXPENSES	94857	94425	93949	93426	92851	92218	91522	90757	89914	88988
NET BOOK EXPENSES	94857	94425	93949	93426	92851	92218	91522	90757	89914	88988
NET CASH FLOW OUT	113962	33169	34754	36224	37595	38882	40099	41258	42372	43451
PW FACTOR AT 15.0	0.8696	0.7561	0.6575	0.5718	0.4972	0.4323	0.3759	0.3269	0.2843	0.2472
PW OF NET CASH FLOW OUT	99097	25080	22851	20711	18692	16810	15075	13487	12045	10741

TABLE 11-100

INVESTMENT ANALYSIS FOR CLE MUC7 GIA7 B1 B2 B3 B4 B5 — DATE 4/23/79

ALTERNATIVE - 5 - B-5

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
- INVESTMENT -										
CAPITAL REQUIRED	0	0	0	0	0	0	0	0	0	0
SALVAGE VALUE	0	0	0	0	0	0	0	0	0	0
DEPRECIABLE AMOUNT	0	0	0	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	11210	12331	13564	14920	16412	18054	19859	21845	24029	26432
OUTSTANDING CAPITAL	167441	155110	141546	126626	110214	92160	72301	50456	26427	-5
- BOOK EXPENSES -										
BOOK DEPRECIATION	16502	16502	16502	16502	16502	16502	16502	16502	16502	16502
DEBT INTEREST	17865	16744	15511	14155	12663	11021	9216	7230	5046	2643
STATE/LOCAL PROP. TAXES	3300	3300	3300	3300	3300	3300	3300	3300	3300	3300
INSURANCE	3300	3300	3300	3300	3300	3300	3300	3300	3300	3300
SUB TOTAL	40968	39847	38614	37257	35765	34124	32319	30333	28148	25746
FUEL	14264	14264	14264	14264	14264	14264	14264	14264	14264	14264
MAINTENANCE	7300	7300	7300	7300	7300	7300	7300	7300	7300	7300
ELECTRICAL POWER	25437	25437	25437	25437	25437	25437	25437	25437	25437	25437
TOTAL BOOK EXPENSES	87969	86848	85615	84258	82766	81125	79320	77334	75149	72747
NET BOOK EXPENSES	87969	86848	85615	84258	82766	81125	79320	77334	75149	72747
NET CASH FLOW OUT	44508	45024	45591	46215	46902	47657	48487	49400	50405	51511
PW FACTOR AT 15.0	0.2149	0.1869	0.1625	0.1413	0.1229	0.1069	0.0929	0.0808	0.0703	0.0611
PW OF NET CASH FLOW OUT	9567	8415	7410	6532	5764	5093	4506	3992	3542	3147
TOTAL PRESENT WORTH OF NET CASH FLOW OUT	312556									

TABLE 11-101

INVESTMENT ANALYSIS FOR LLE MOD7 DIA7 B1 B2 B3 B4 B5 DATE 4/23/79

ALTERNATIVE - 1 - B-1

COMBINED LOAN SCHEDULE

YR	PRINCIPAL	DEBT REPAYMENT	INTEREST	PRINCIPAL PAYMENT
1	176299	20708	17630	3078
2	173221	20708	17322	3386
3	169835	20708	16983	3725
4	166110	20708	16611	4097
5	162013	20708	16201	4507
6	157506	20708	15751	4957
7	152549	20708	15255	5453
8	147096	20708	14710	5998
9	141097	20708	14110	6598
10	134499	20708	13450	7258
11	127240	20708	12724	7984
12	119256	20708	11926	8782
13	110474	20708	11047	9661
14	100813	20708	10081	10627
15	90187	20708	9019	11689
16	78497	20708	7851	12858
17	65639	20708	6564	14144
18	51495	20708	5149	15559
19	35936	20708	3594	17114
20	18822	20708	1882	18826
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0
30	0	0	0	0
TOT	2378576	414160	237858	176302

INDIVIDUAL DEPRECIATION SCHEDULES

YR	BOOK DEPRECIATION METHOD - STL			TAX DEPRECIATION METHOD - DDB		
	INVS 1	INVS 2	INVS 3	INVS 1	INVS 2	INVS 3
1	11753	0	0	23506	0	0
2	11753	0	0	21156	0	0
3	11753	0	0	19040	0	0
4	11753	0	0	17136	0	0
5	11753	0	0	15423	0	0
6	11753	0	0	13880	0	0
7	11753	0	0	12492	0	0
8	11753	0	0	11243	0	0
9	11753	0	0	10119	0	0
10	11753	0	0	9107	0	0
11	11753	0	0	8196	0	0
12	11753	0	0	8196	0	0
13	11753	0	0	8196	0	0
14	11753	0	0	8196	0	0
15	11753	0	0	8196	0	0
16	11753	0	0	8196	0	0
17	11753	0	0	8196	0	0
18	11753	0	0	8196	0	0
19	11753	0	0	8196	0	0
20	11753	0	0	8196	0	0
21	0	0	0	0	0	0
22	0	0	0	0	0	0
23	0	0	0	0	0	0
24	0	0	0	0	0	0
25	0	0	0	0	0	0
26	0	0	0	0	0	0
27	0	0	0	0	0	0
28	0	0	0	0	0	0
29	0	0	0	0	0	0
30	0	0	0	0	0	0
	235065	0	0	235064	0	0

TABLE 11-102

INVESTMENT ANALYSIS FOR CLE MOD7 GIA7 B1 B2 B3 B4 B5 — DATE 4/23/79

ALTERNATIVE - 2 - B-2

COMBINED LOAN SCHEDULE

YR	PRINCIPAL	DEBT REPAYMENT	INTEREST	PRINCIPAL PAYMENT
1	236625	27794	23662	4131
2	232494	27794	23249	4545
3	227949	27794	22795	4999
4	222950	27794	22295	5499
5	217451	27794	21745	6049
6	211402	27794	21140	6654
7	204748	27794	20475	7319
8	197429	27794	19743	8051
9	189378	27794	18938	8856
10	180522	27794	18052	9742
11	170780	27794	17078	10716
12	160064	27794	16006	11788
13	148276	27794	14828	12966
14	135310	27794	13531	14263
15	121047	27794	12105	15689
16	105357	27794	10536	17258
17	88099	27794	8811	18984
18	69115	27794	6912	20882
19	48233	27794	4823	22971
20	25262	27794	2526	25268
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0
30	0	0	0	0
TOT	3192479	555879	319248	236631

INDIVIDUAL DEPRECIATION SCHEDULES

YR	BOOK DEPRECIATION METHOD - STL			TAX DEPRECIATION METHOD - DDB		
	INVS 1	INVS 2	INVS 3	INVS 1	INVS 2	INVS 3
1	15775	0	0	31550	0	0
2	15775	0	0	28395	0	0
3	15775	0	0	25555	0	0
4	15775	0	0	23000	0	0
5	15775	0	0	20700	0	0
6	15775	0	0	18630	0	0
7	15775	0	0	16767	0	0
8	15775	0	0	15090	0	0
9	15775	0	0	13581	0	0
10	15775	0	0	12223	0	0
11	15775	0	0	11001	0	0
12	15775	0	0	11001	0	0
13	15775	0	0	11001	0	0
14	15775	0	0	11001	0	0
15	15775	0	0	11001	0	0
16	15775	0	0	11001	0	0
17	15775	0	0	11001	0	0
18	15775	0	0	11001	0	0
19	15775	0	0	11001	0	0
20	15775	0	0	11001	0	0
21	0	0	0	0	0	0
22	0	0	0	0	0	0
23	0	0	0	0	0	0
24	0	0	0	0	0	0
25	0	0	0	0	0	0
26	0	0	0	0	0	0
27	0	0	0	0	0	0
28	0	0	0	0	0	0
29	0	0	0	0	0	0
30	0	0	0	0	0	0
	315500	0	0	315499	0	0

TABLE 11-103

INVESTMENT ANALYSES FOR CLE MOC7 G1A7 B1 B2 B3 B4 B5 DATE 4/2?/79

ALTERNATIVE - 3 - B-3

COMBINED LOAN SCHEDULE

YR	PRINCIPAL	DEBT REPAYMENT	INTEREST	PRINCIPAL PAYMENT
1	194250	22817	19425	3392
2	190858	22817	19086	3731
3	187128	22817	18713	4104
4	183024	22817	18302	4514
5	178509	22817	17851	4966
6	173544	22817	17354	5462
7	168082	22817	16808	6008
8	162073	22817	16207	6609
9	155464	22817	15546	7270
10	148195	22817	14819	7997
11	140196	22817	14020	8797
12	131399	22817	13140	9677
13	121723	22817	12172	10644
14	111078	22817	11108	11709
15	99369	22817	9937	12880
16	86490	22817	8649	14168
17	72322	22817	7232	15584
18	56738	22817	5674	17143
19	39595	22817	3959	18857
20	20738	22817	2074	20743
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0
30	0	0	0	0
TOT	2620765	456331	262076	194254

INDIVIDUAL DEPRECIATION SCHEDULES

YR	BOOK DEPRECIATION METHOD - STL			TAX DEPRECIATION METHOD - DDB		
	INVS 1	INVS 2	INVS 3	INVS 1	INVS 2	INVS 3
1	12950	0	0	25900	0	0
2	12950	0	0	23310	0	0
3	12950	0	0	20979	0	0
4	12950	0	0	18881	0	0
5	12950	0	0	16993	0	0
6	12950	0	0	15294	0	0
7	12950	0	0	13764	0	0
8	12950	0	0	12388	0	0
9	12950	0	0	11149	0	0
10	12950	0	0	10034	0	0
11	12950	0	0	9031	0	0
12	12950	0	0	9031	0	0
13	12950	0	0	9031	0	0
14	12950	0	0	9031	0	0
15	12950	0	0	9031	0	0
16	12950	0	0	9031	0	0
17	12950	0	0	9031	0	0
18	12950	0	0	9031	0	0
19	12950	0	0	9031	0	0
20	12950	0	0	9031	0	0
21	0	0	0	0	0	0
22	0	0	0	0	0	0
23	0	0	0	0	0	0
24	0	0	0	0	0	0
25	0	0	0	0	0	0
26	0	0	0	0	0	0
27	0	0	0	0	0	0
28	0	0	0	0	0	0
29	0	0	0	0	0	0
30	0	0	0	0	0	0
	259000	0	0	258999	0	0

TABLE 11-104

INVESTMENT ANALYSIS FOR CLE MUC7 GIA7 B1 B2 B3 B4 B5 DATE 4/23/79

ALTERNATIVE - 4 - B-4

COMBINED LOAN SCHEDULE

YR	PRINCIPAL	DEBT REPAYMENT	INTEREST	PRINCIPAL PAYMENT
1	247531	29075	24753	4322
2	243209	29075	24321	4754
3	238455	29075	23845	5229
4	233225	29075	23323	5752
5	227473	29075	22747	6328
6	221145	29075	22115	6960
7	214185	29075	21418	7656
8	206528	29075	20653	8422
9	198106	29075	19811	9264
10	188842	29075	18884	10191
11	178651	29075	17865	11210
12	167441	29075	16744	12331
13	155110	29075	15511	13564
14	141546	29075	14155	14920
15	126626	29075	12663	16412
16	110214	29075	11021	18054
17	92160	29075	9216	19859
18	72301	29075	7230	21845
19	50456	29075	5046	24029
20	26427	29075	2643	26432
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0
30	0	0	0	0
TOT	3339622	581498	333962	247536

INDIVIDUAL DEPRECIATION SCHEDULES

YR	BOOK DEPRECIATION METHOD - STL			TAX DEPRECIATION METHOD - DDB		
	INVS 1	INVS 2	INVS 3	INVS 1	INVS 2	INVS 3
1	16502	0	0	33004	0	0
2	16502	0	0	29704	0	0
3	16502	0	0	26733	0	0
4	16502	0	0	24060	0	0
5	16502	0	0	21654	0	0
6	16502	0	0	19489	0	0
7	16502	0	0	17540	0	0
8	16502	0	0	15786	0	0
9	16502	0	0	14207	0	0
10	16502	0	0	12786	0	0
11	16502	0	0	11508	0	0
12	16502	0	0	11508	0	0
13	16502	0	0	11508	0	0
14	16502	0	0	11508	0	0
15	16502	0	0	11508	0	0
16	16502	0	0	11508	0	0
17	16502	0	0	11508	0	0
18	16502	0	0	11508	0	0
19	16502	0	0	11508	0	0
20	16502	0	0	11508	0	0
21	0	0	0	0	0	0
22	0	0	0	0	0	0
23	0	0	0	0	0	0
24	0	0	0	0	0	0
25	0	0	0	0	0	0
26	0	0	0	0	0	0
27	0	0	0	0	0	0
28	0	0	0	0	0	0
29	0	0	0	0	0	0
30	0	0	0	0	0	0
	330040	0	0	330040	0	0

TABLE 11-105

INVESTMENT ANALYSIS FOR CLE MUCF G1A7 B1 B2 B3 B4 B5 DATE 4/20/79

ALTERNATIVE - 5 - B-5

COMBINED LOAN SCHEDULE

YR	PRINCIPAL	DEBT REPAYMENT	INTEREST	PRINCIPAL PAYMENT
1	247531	29075	24753	4322
2	243209	29075	24321	4754
3	238455	29075	23845	5229
4	233225	29075	23323	5752
5	227473	29075	22747	6328
6	221145	29075	22115	6960
7	214185	29075	21418	7656
8	206528	29075	20653	8422
9	198106	29075	19811	9264
10	188842	29075	18884	10191
11	178651	29075	17865	11210
12	167441	29075	16744	12331
13	155110	29075	15511	13564
14	141546	29075	14155	14920
15	126626	29075	12663	16412
16	110214	29075	11021	18054
17	92160	29075	9216	19859
18	72301	29075	7230	21845
19	50456	29075	5046	24029
20	26427	29075	2643	26432
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0
30	0	0	0	0
TOT	3339622	581498	333962	247536

INDIVIDUAL DEPRECIATION SCHEDULES

YR	BOOK DEPRECIATION METHOD - STL			TAX DEPRECIATION METHOD - DDB		
	INVS 1	INVS 2	INVS 3	INVS 1	INVS 2	INVS 3
1	16502	0	0	33004	0	0
2	16502	0	0	29704	0	0
3	16502	0	0	26733	0	0
4	16502	0	0	24060	0	0
5	16502	0	0	21654	0	0
6	16502	0	0	19489	0	0
7	16502	0	0	17540	0	0
8	16502	0	0	15786	0	0
9	16502	0	0	14207	0	0
10	16502	0	0	12786	0	0
11	16502	0	0	11508	0	0
12	16502	0	0	11508	0	0
13	16502	0	0	11508	0	0
14	16502	0	0	11508	0	0
15	16502	0	0	11508	0	0
16	16502	0	0	11508	0	0
17	16502	0	0	11508	0	0
18	16502	0	0	11508	0	0
19	16502	0	0	11508	0	0
20	16502	0	0	11508	0	0
21	0	0	0	0	0	0
22	0	0	0	0	0	0
23	0	0	0	0	0	0
24	0	0	0	0	0	0
25	0	0	0	0	0	0
26	0	0	0	0	0	0
27	0	0	0	0	0	0
28	0	0	0	0	0	0
29	0	0	0	0	0	0
30	0	0	0	0	0	0
	330040	0	0	330040	0	0

TABLE 11-106

INVESTMENT ANALYSIS FOR CLE MOCF G1A7 B1 B2 B3 B4 B5 DATE 4/20/79

ALTERNATIVE - 1 - B-1

INCOME TAXES AND NET CASH FLOW CALCULATION

YR	A NET BOOK EXPENSES	B DEPRECIATION -BOOK-	C DEPRECIATION -TAX-	D STATE TAXABLE BASE D=A-B+C	E STATE INCOME TAX SAVINGS	F FEDERAL TAXABLE BASE F=D-E	G FEDERAL INCOME TAX SAVINGS	H AFTER TAX EXPENSES H=A-E-G	J EQUITY INVESTMENT & PRINCIPAL PAYMENTS	K NET CASH FLOW OUT K=H-B+J
1	85535	11753	23506	97289	0	97289	44753	40783	61844	93874
2	85228	11753	21156	94630	0	94630	43530	41698	3386	33330
3	84849	11753	19342	92176	0	92176	42401	42488	3725	34459
4	84517	11753	17136	89899	0	89899	41354	43163	4097	35537
5	84177	11753	15423	87776	0	87776	40377	43730	4507	36483
6	83656	11753	13880	85783	0	85783	39460	44196	4957	37400
7	83160	11753	12492	83899	0	83899	38594	44567	5453	38267
8	82615	11753	11243	82105	0	82105	37768	44847	5998	39092
9	82015	11753	10119	80381	0	80381	36975	45040	6598	39885
10	81355	11753	9107	78709	0	78709	36206	45149	7258	40654
11	80630	11753	8196	77073	0	77073	35453	45176	7984	41437
12	79831	11753	8196	76274	0	76274	35086	44745	8782	41774
13	78953	11753	8196	75396	0	75396	34682	44271	9661	42178
14	77987	11753	8196	74430	0	74430	34238	43749	10627	42623
15	76924	11753	8196	73367	0	73367	33749	43175	11689	43111
16	75755	11753	8196	72198	0	72198	33211	42544	12858	43649
17	74469	11753	8196	70912	0	70912	32620	41850	14144	44241
18	73055	11753	8196	69498	0	69498	31969	41086	15559	44891
19	71499	11753	8196	67942	0	67942	31253	40246	17114	45637
20	69788	11753	8196	66231	0	66231	30466	39322	18826	46394
TOT	1595965	235065	235065	1595964	0	1595964	734145	861823	235068	861827

K - THE REMAINING BOOK VALUE OR SALVAGE VALUE OF AN INVESTMENT IS SUBTRACTED FROM THE CASH FLOW AT ITS PRESENT WORTH VALUE AT THE TERMINATION OF THE STUDY

TABLE 11-107

INVESTMENT ANALYSIS FOR CLE MUCF GIAF B1 B2 B3 B4 B5 DATE 4/20/79

ALTERNATIVE - 2 - B-2

INCOME TAXES AND NET CASH FLOW CALCULATION

	A	B	C	D	E	F	G	H	J	K
YR	NET BOOK EXPENSES	DEPRECIATION -BOOK-	DEPRECIATION -TAX-	STATE TAXABLE BASE D=A-B+C	STATE INCOME TAX SAVINGS	FEDERAL TAXABLE BASE F=D-E	FEDERAL INCOME TAX SAVINGS	AFTER TAX EXPENSES H=A-E-G	EQUITY INVESTMENT & PRINCIPAL PAYMENTS	NET CASH FLOW OUT K=H-B+J
1	112676	15775	31550	128451	0	128451	59088	53589	83006	12782[illegible]
2	112263	15775	28395	124883	0	124883	57446	54817	4545	43587
3	111809	15775	25555	121589	0	121589	55931	55878	4999	45102
4	111309	15775	23000	118534	0	118534	54526	56783	5499	46507
5	110759	15775	20700	115684	0	115684	53215	57544	6049	47818
6	110154	15775	18630	113029	0	113029	51984	58170	6654	49049
7	109489	15775	16767	110481	0	110481	50821	58668	7319	50212
8	108757	15775	15090	108072	0	108072	49713	59044	8051	51320
9	107952	15775	13581	105758	0	105758	48649	59303	8856	52334
10	107066	15775	12223	103514	0	103514	47617	59450	9742	53416
11	106092	15775	11001	101318	0	101318	46606	59486	10716	54427
12	105020	15775	11001	100246	0	100246	46113	58907	11788	54920
13	103842	15775	11001	99067	0	99067	45571	58271	12966	55462
14	102545	15775	11001	97771	0	97771	44975	57570	14263	56058
15	101119	15775	11001	96344	0	96344	44318	56800	15689	56714
16	99550	15775	11001	94775	0	94775	43597	55953	17258	57436
17	97824	15775	11001	93050	0	93050	42803	55021	18984	58230
18	95925	15775	11001	91151	0	91151	41930	53996	20882	59103
19	93837	15775	11001	89063	0	89063	40969	52868	22971	60064
20	91540	15775	11001	86766	0	86766	39912	51628	25268	61121
TOT	2099522	315500	315500	2099522	0	2099522	965782	1133744	315505	1133749

K - THE REMAINING BOOK VALUE OR SALVAGE VALUE OF AN INVESTMENT IS SUBTRACTED FROM THE CASH FLOW AT ITS PRESENT WORTH VALUE AT THE TERMINATION OF THE STUDY

TABLE 11-108

INVESTMENT ANALYSIS FOR CEE MOD/ GIA7 B1 B2 B3 B4 B5 DATE 4/20/79

ALTERNATIVE - 3 - B-3

INCOME TAXES AND NET CASH FLOW CALCULATION

YR	A NET BOOK EXPENSES	B DEPRECIATION -BOOK-	C DEPRECIATION -TAX-	D STATE TAXABLE BASE D=A-B+C	E STATE INCOME TAX SAVINGS	F FEDERAL TAXABLE BASE F=D-E	G FEDERAL INCOME TAX SAVINGS	H AFTER TAX EXPENSES H=A-E-G	J EQUITY INVESTMENT & PRINCIPAL PAYMENTS	K NET CASH FLOW OUT K=H-B+J
1	101247	12950	25930	114197	0	114197	52531	48716	68142	103908
2	100908	12950	23310	111268	0	111268	51183	49725	3731	40535
3	100535	12950	20979	108564	0	108564	49939	50595	4104	41749
4	100124	12950	18881	106055	0	106055	48785	51339	4514	42903
5	99673	12950	16993	103716	0	103716	47709	51964	4966	43979
6	99176	12950	15294	101520	0	101520	46699	52477	5462	44989
7	98630	12950	13764	99444	0	99444	45744	52886	6008	45944
8	98029	12950	12388	97467	0	97467	44835	53194	6609	46854
9	97368	12950	11149	95567	0	95567	43961	53407	7270	47728
10	96641	12950	10034	93725	0	93725	43114	53528	7997	48575
11	95842	12950	9031	91922	0	91922	42284	53557	8797	49404
12	94962	12950	9031	91043	0	91043	41880	53082	9677	49809
13	93994	12950	9031	90075	0	90075	41434	52560	10644	50254
14	92937	12950	9031	89111	0	89111	40945	51985	11709	50744
15	91759	12950	9031	87840	0	87840	40406	51353	12880	51282
16	90471	12950	9031	86552	0	86552	39814	50657	14168	51875
17	89054	12950	9031	85135	0	85135	39162	49892	15584	52527
18	87496	12950	9031	83577	0	83577	38445	49051	17143	53243
19	85781	12950	9031	81862	0	81862	37657	48125	18857	54032
20	83896	12950	9031	79977	0	79977	36789	47107	20743	54899
TOT	1898510	259000	259000	1898510	0	1898510	873317	1025199	259004	1025203

K - THE REMAINING BOOK VALUE OR SALVAGE VALUE OF AN INVESTMENT IS SUBTRACTED FROM THE CASH FLOW AT ITS PRESENT WORTH VALUE AT THE TERMINATION OF THE STUDY

TABLE 11-109

INVESTMENT ANALYSIS FOR CLE MOD7 GIAF B1 B2 B3 B4 B5 DATE 4/20/79

ALTERNATIVE - 4 - B-4

INCOME TAXES AND NET CASH FLOW CALCULATION

YR	A NET BOOK EXPENSES	B DEPRECIATION -BOOK-	C DEPRECIATION -TAX-	D STATE TAXABLE BASE D=A-B+C	E STATE INCOME TAX SAVINGS	F FEDERAL TAXABLE BASE F=D-E	G FEDERAL INCOME TAX SAVINGS	H AFTER TAX EXPENSES H=A-E-G	J EQUITY INVESTMENT & PRINCIPAL PAYMENTS	K NET CASH FLOW OUT K=H-B+J
1	96648	16502	33004	113150	0	113150	52049	44599	86832	114929
2	96216	16502	29704	109417	0	109417	50332	45884	4754	34136
3	95740	16502	26733	105972	0	105972	48747	46993	5229	35721
4	95217	16502	24060	102775	0	102775	47277	47941	5752	37191
5	94642	16502	21654	99794	0	99794	45905	48737	6328	38563
6	94009	16502	19489	96996	0	96996	44618	49391	6960	39850
7	93313	16502	17540	94351	0	94351	43401	49912	7656	41366
8	92548	16502	15786	91831	0	91831	42242	50305	8422	42225
9	91705	16502	14207	89411	0	89411	41129	50577	9264	43339
10	90779	16502	12786	87063	0	87063	40049	50730	10191	44419
11	89760	16502	11508	84766	0	84766	38992	50768	11210	45476
12	88639	16502	11508	83645	0	83645	38477	50162	12331	45991
13	87406	16502	11508	82412	0	82412	37909	49497	13564	46558
14	86049	16502	11508	81055	0	81055	37285	48764	14920	47182
15	84557	16502	11508	79563	0	79563	36599	47958	16412	47869
16	82916	16502	11508	77922	0	77922	35844	47072	18054	48624
17	81111	16502	11508	76117	0	76117	35014	46097	19859	49454
18	79125	16502	11508	74131	0	74131	34100	45025	21845	50368
19	76940	16502	11508	71946	0	71946	33095	43845	24029	51372
20	74538	16502	11508	69543	0	69543	31990	42548	26432	52478
TOT	1771854	330040	330040	1771854	0	1771854	815054	956804	330045	956809

K - THE REMAINING BOOK VALUE OR SALVAGE VALUE OF AN INVESTMENT IS SUBTRACTED FROM THE CASH FLOW AT ITS PRESENT WORTH VALUE AT THE TERMINATION OF THE STUDY

TABLE 11-110

INVESTMENT ANALYSIS FOR CLE MOCF GIAF B1 B2 B3 B4 B5 DATE 4/20/79

ALTERNATIVE - 5 - B-5

INCOME TAXES AND NET CASH FLOW CALCULATION

YR	A NET BOOK EXPENSES	B DEPRECIATION -BOOK-	C -TAX-	D STATE TAXABLE BASE D=A-B+C	E STATE INCOME TAX SAVINGS	F FEDERAL TAXABLE BASE F=D-E	G FEDERAL INCOME TAX SAVINGS	H AFTER TAX EXPENSES H=A-E-G	J EQUITY INVESTMENT & PRINCIPAL PAYMENTS	K NET CASH FLOW OUT K=H-B+J
1	94857	16502	33004	111359	0	111359	51225	43632	86832	113962
2	94425	16502	29704	107626	0	107626	49538	44917	4754	33169
3	93949	16502	26733	104181	0	104181	47923	46026	5229	34754
4	93426	16502	24062	100984	0	100984	46453	46974	5752	36224
5	92851	16502	21654	98033	0	98033	45081	47770	6328	37595
6	92218	16502	19489	95235	0	95235	43794	48424	6963	38882
7	91522	16502	17540	92560	0	92560	42578	48945	7656	40399
8	90757	16502	15786	90040	0	90040	41419	49338	8422	41258
9	89914	16502	14207	87620	0	87620	40305	49609	9264	42372
10	88988	16502	12786	85272	0	85272	39225	49763	10191	43451
11	87969	16502	11508	82975	0	82975	38168	49801	11210	44538
12	86848	16502	11508	81654	0	81654	37653	49195	12331	45024
13	85615	16502	11508	80621	0	80621	37085	48529	13564	45591
14	84258	16502	11508	79264	0	79264	36461	47797	14920	46215
15	82766	16502	11508	77772	0	77772	35775	46991	16412	46902
16	81125	16502	11508	76131	0	76131	35020	46105	18054	47657
17	79320	16502	11508	74326	0	74326	34190	45130	19859	48487
18	77334	16502	11508	72340	0	72340	33276	44058	21845	49400
19	75149	16502	11508	70155	0	70155	32271	42878	24029	50435
20	72747	16502	11508	67752	0	67752	31166	41580	26432	51511
TOT	1736034	330040	330040	1736034	0	1736034	798577	937461	330045	937467

K - THE REMAINING BOOK VALUE OR SALVAGE VALUE OF AN INVESTMENT IS SUBTRACTED FROM THE CASH FLOW AT ITS PRESENT WORTH VALUE AT THE TERMINATION OF THE STUDY

TABLE 11-111

ASHRAE BASED SOLAR TABLES FOR

SOLAR TABLE RUN FOR CLEVELAND

LATITUDE = 41.3
LONGITUDE = 81.8
TIME ZONE = 5
ATMOS CLEANS = 0.95
GRND REFLC = 0.14
IN FLW FRAC =0.095
DST KEY = 0
TAPE KEY = 0

LAGGING DATA

VERT PCT = 42
VERT HRS = 3
VERT TYP = 0

HORIZ PCT = 10
HORIZ HRS = 6
HORIZ TYP = 0

ALP VALUES	TAU VALUES
0.01154	-0.00890
0.77674	2.71240
-3.94700	-0.62060
8.57880	-7.07300
-8.38100	9.76000
3.01190	-3.89900

WALL AZIM	TILT
1.0	0
45.0	0
90.0	0
135.0	0
180.0	0
225.0	0
270.0	0
315.0	0

TABLE 11-112

** JAN SOLAR HEAT GAIN FACTORS FOR 41.3 DEGS LATITUDE ** (NO SHADING OR LAGGING EFFECTS)

	12M	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
ALT	0.	0.	0.	0.	0.0	0.0	0.0	0.0	3.0	12.1	19.8	25.4	28.3	28.2	25.0	19.2	11.4	2.1	0.0	0.0	0.	0.	0.	0.
AZIM	0.	0.	0.	0.	0.0	0.0	0.0	0.0	-59.9	-49.1	-36.8	-22.8	-7.3	8.7	24.1	37.9	50.1	60.8	0.0	0.0	0.	0.	0.	0.
DNI	0	0	0	0	0	0	0	0	24	189	244	266	275	274	265	241	180	8	0	0	0	0	0	0
1.0	0	0	0	0	0	0	0	0	1	7	11	14	15	15	13	11	7	0	0	0	0	0	0	0
49.0	0	0	0	0	0	0	0	0	4	11	12	14	15	15	13	11	7	0	0	0	0	0	0	0
90.0	0	0	0	0	0	0	0	0	20	133	130	82	26	15	13	11	7	0	0	0	0	0	0	0
135.0	0	0	0	0	0	0	0	0	22	177	221	217	186	137	74	21	7	0	0	0	0	0	0	0
180.0	0	0	0	0	0	0	0	0	11	114	177	216	235	234	214	172	107	3	0	0	0	0	0	0
225.0	0	0	0	0	0	0	0	0	1	8	24	80	142	189	219	219	169	7	0	0	0	0	0	0
270.0	0	0	0	0	0	0	0	0	1	7	11	14	16	29	87	133	129	6	0	0	0	0	0	0
315.0	0	0	0	0	0	0	0	0	1	7	11	14	15	15	13	12	12	2	0	0	0	0	0	0
HORIZ	0	0	0	0	0	0	0	0	1	29	69	101	117	116	98	65	26	0	0	0	0	0	0	0

** FEB SOLAR HEAT GAIN FACTORS FOR 41.3 DEGS LATITUDE ** (NO SHADING OR LAGGING EFFECTS)

	12M	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
ALT	0.	0.	0.	0.	0.0	0.0	0.0	0.0	9.6	19.4	27.8	34.1	37.5	37.3	33.7	27.1	18.6	8.7	0.0	0.0	0.	0.	0.	0.
AZIM	0.	0.	0.	0.	0.0	0.0	0.0	0.0	-66.3	-55.0	-41.7	-26.2	-8.5	10.1	27.7	43.0	56.0	67.3	0.0	0.0	0.	0.	0.	0.
DNI	0	0	0	0	0	0	0	0	154	237	269	283	289	288	282	267	233	141	0	0	0	0	0	0
1.0	0	0	0	0	0	0	0	0	6	11	15	17	18	18	17	14	11	5	0	0	0	0	0	0
49.0	0	0	0	0	0	0	0	0	47	29	16	17	18	18	17	14	11	5	0	0	0	0	0	0
90.0	0	0	0	0	0	0	0	0	134	177	153	95	30	19	17	14	11	5	0	0	0	0	0	0
135.0	0	0	0	0	0	0	0	0	137	215	233	218	181	126	59	17	11	5	0	0	0	0	0	0
180.0	0	0	0	0	0	0	0	0	53	121	172	217	224	223	204	168	116	46	0	0	0	0	0	0
225.0	0	0	0	0	0	0	0	0	6	11	18	65	131	185	221	233	211	124	0	0	0	0	0	0
270.0	0	0	0	0	0	0	0	0	6	11	15	17	19	34	101	157	177	124	0	0	0	0	0	0
315.0	0	0	0	0	0	0	0	0	6	11	15	17	18	18	17	16	31	45	0	0	0	0	0	0
HORIZ	0	0	0	0	0	0	0	0	19	66	113	146	162	162	144	109	61	15	0	0	0	0	0	0

TABLE 11-113

** MAR SOLAR HEAT GAIN FACTORS FOR 41.3 DEGS LATITUDE ** (NO SHADING OR LAGGING EFFECTS)

	12M	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
ALT	0.	0.	0.	0.	0.0	0.0	0.0	6.1	17.2	27.6	36.9	44.2	48.2	48.0	43.7	36.2	26.8	16.2	5.1	0.0	0.	0.	0.	0.
AZIM	0.	0.	0.	0.	0.0	0.0	0.0	-84.6	-74.2	-62.6	-48.6	-31.2	-10.3	12.3	32.9	50.0	63.7	75.2	85.5	0.0	0.	0.	0.	0.
DNI	0	0	0	0	0	0	0	83	211	255	276	286	290	290	285	274	253	204	62	0	0	0	0	0
1.0	0	0	0	0	0	0	0	4	10	15	18	21	22	22	20	18	15	10	3	0	0	0	0	0
45.0	0	0	0	0	0	0	0	50	92	59	22	21	22	22	20	18	15	10	2	0	0	0	0	0
90.0	0	0	0	0	0	0	0	79	191	199	164	102	35	22	20	18	15	10	2	0	0	0	0	0
135.0	0	0	0	0	0	0	0	61	173	214	220	200	160	101	40	19	15	10	2	0	0	0	0	0
180.0	0	0	0	0	0	0	0	6	45	98	144	176	192	191	174	141	93	41	4	0	0	0	0	0
225.0	0	0	0	0	0	0	0	3	10	15	20	44	107	164	203	221	212	167	45	0	0	0	0	0
270.0	0	0	0	0	0	0	0	3	10	15	18	21	23	39	108	169	201	187	60	0	0	0	0	0
315.0	0	0	0	0	0	0	0	3	10	15	18	21	22	22	21	24	63	93	38	0	0	0	0	0
HORIZ	0	0	0	0	0	0	0	8	52	109	156	188	204	203	186	152	104	47	5	0	0	0	0	0

** APR SOLAR HEAT GAIN FACTORS FOR 41.3 DEGS LATITUDE ** (NO SHADING OR LAGGING EFFECTS)

	12M	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
ALT	0.	0.	0.	0.	0.0	0.0	2.6	13.7	25.0	36.0	46.2	54.6	59.7	59.4	54.0	45.3	35.0	24.0	12.7	1.6	0.	0.	0.	0.
AZIM	0.	0.	0.	0.	0.0	0.0	-103.2	-93.5	-83.4	-72.1	-58.0	-39.0	-13.3	15.9	41.0	59.4	73.2	84.4	94.4	104.1	0.	0.	0.	0.
DNI	0	0	0	0	0	0	6	160	223	252	266	274	278	277	274	266	250	220	151	1	0	0	0	0
1.0	0	0	0	0	0	0	1	13	16	20	23	25	26	26	25	23	19	16	13	0	0	0	0	0
45.0	0	0	0	0	0	0	5	117	128	92	43	27	26	26	25	23	19	15	9	0	0	0	0	0
90.0	0	0	0	0	0	0	6	157	207	201	164	103	39	27	25	23	19	15	9	0	0	0	0	0
135.0	0	0	0	0	0	0	3	103	162	188	188	166	125	70	29	23	19	15	9	0	0	0	0	0
180.0	0	0	0	0	0	0	0	10	24	60	99	129	144	143	127	96	56	22	10	0	0	0	0	0
225.0	0	0	0	0	0	0	0	9	15	20	24	31	75	130	169	189	186	158	96	0	0	0	0	0
270.0	0	0	0	0	0	0	0	9	15	20	23	25	27	43	109	168	203	205	149	1	0	0	0	0
315.0	0	0	0	0	0	0	0	9	15	20	23	25	26	26	27	47	97	129	112	1	0	0	0	0
HORIZ	0	0	0	0	0	0	1	34	91	145	188	218	234	233	216	184	140	85	30	0	0	0	0	0

TABLE 11-114

** MAY SOLAR HEAT GAIN FACTORS FOR 41.3 DEGS LATITUDE ** (NO SHADING OR LAGGING EFFECTS)

	12M	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
ALT	0.	0.	0.	0.	0.0	0.0	8.2	19.0	30.2	41.4	52.2	61.7	67.9	67.6	61.0	51.3	40.5	29.2	18.0	7.2	0.	0.	0.	0.
AZIM	0.	0.	0.	0.	0.0	0.0	-109.5	-100.3	-90.8	-80.3	-66.9	-47.0	-17.3	20.5	49.7	68.3	81.3	91.7	101.1	110.3	0.	0.	0.	0.
DNI	0	0	0	0	0	0	84	182	225	247	259	266	269	269	266	259	246	223	177	70	0	0	0	0
1.0	0	0	0	0	0	0	26	30	22	24	26	28	29	29	28	26	24	22	31	23	0	0	0	0
45.0	0	0	0	0	0	0	78	148	148	114	63	32	30	29	28	26	23	19	13	4	0	0	0	0
90.0	0	0	0	0	0	0	81	178	207	196	159	101	42	30	28	26	23	19	13	4	0	0	0	0
135.0	0	0	0	0	0	0	35	102	144	163	160	138	98	51	30	26	23	19	13	4	0	0	0	0
180.0	0	0	0	0	0	0	5	14	21	37	66	92	106	105	90	64	35	21	14	4	0	0	0	0
225.0	0	0	0	0	0	0	5	14	19	23	26	31	54	102	141	161	162	141	97	29	0	0	0	0
270.0	0	0	0	0	0	0	5	14	19	23	26	28	31	46	107	163	198	206	173	67	0	0	0	0
315.0	0	0	0	0	0	0	5	14	19	23	26	28	29	30	32	68	118	150	146	65	0	0	0	0
HORIZ	0	0	0	0	0	0	13	59	115	165	206	234	249	248	232	203	161	111	54	10	0	0	0	0

** JUN SOLAR HEAT GAIN FACTORS FOR 41.3 DEGS LATITUDE ** (NO SHADING OR LAGGING EFFECTS)

	12M	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
ALT	0.	0.	0.	0.	0.0	0.4	10.4	21.1	32.3	43.5	54.5	64.5	71.2	70.9	63.7	53.6	42.5	31.3	20.2	9.5	0.	0.	0.	0.
AZIM	0.	0.	0.	0.	0.0	-121.6	-112.2	-103.2	-94.1	-84.0	-71.3	-52.3	-19.8	23.4	54.4	72.6	85.0	94.9	104.0	113.0	0.	0.	0.	0.
DNI	0	0	0	0	0	0	105	186	223	243	255	261	264	264	261	254	242	221	181	95	0	0	0	0
1.0	0	0	0	0	0	0	39	40	26	27	28	29	30	30	29	28	26	27	41	37	0	0	0	0
45.0	0	0	0	0	0	0	101	157	154	122	72	35	32	30	29	27	24	20	15	7	0	0	0	0
90.0	0	0	0	0	0	0	102	180	203	192	156	99	43	32	29	27	24	20	15	7	0	0	0	0
135.0	0	0	0	0	0	0	41	97	134	151	147	125	86	45	32	27	24	20	15	7	0	0	0	0
180.0	0	0	0	0	0	0	8	15	23	32	54	77	90	89	75	52	31	22	15	7	0	0	0	0
225.0	0	0	0	0	0	0	8	15	21	25	28	32	48	90	128	149	150	131	92	35	0	0	0	0
270.0	0	0	0	0	0	0	8	15	21	25	28	29	32	47	105	160	194	203	176	91	0	0	0	0
315.0	0	0	0	0	0	0	8	15	21	25	28	29	30	32	37	77	126	156	155	91	0	0	0	0
HORIZ	0	0	0	0	0	0	21	69	124	172	211	238	252	251	236	208	168	119	64	18	0	0	0	0

TABLE 11-115

** JUL SOLAR HEAT GAIN FACTORS FOR 41.3 DEGS LATITUDE ** (NO SHADING OR LAGGING EFFECTS)

	12M	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
ALT	0.	0.	0.	0.	0.0	0.0	8.6	19.4	30.6	41.8	52.7	62.2	68.5	68.1	61.5	51.7	40.8	29.6	18.4	7.6	0.	0.	0.	0.
AZIM	0.	0.	0.	0.	0.0	0.0	-110.0	-100.8	-91.4	-80.9	-67.7	-48.4	-17.7	20.9	50.4	69.0	81.9	92.3	101.6	110.8	0.	0.	0.	0.
DNI	0	0	0	0	0	0	81	175	218	240	252	259	262	261	258	251	238	215	170	69	0	0	0	0
1.0	0	0	0	0	0	0	27	31	23	26	27	29	30	30	29	27	25	23	32	24	0	0	0	0
45.0	0	0	0	0	0	0	77	146	147	115	65	33	31	30	29	27	24	20	14	5	0	0	0	0
90.0	0	0	0	0	0	0	80	174	203	193	157	100	43	32	29	27	24	20	14	5	0	0	0	0
135.0	0	0	0	0	0	0	35	99	140	159	157	135	96	51	32	27	24	20	14	5	0	0	0	0
180.0	0	0	0	0	0	0	6	15	22	37	64	89	103	102	87	62	35	22	14	5	0	0	0	0
225.0	0	0	0	0	0	0	6	14	20	24	27	32	54	100	138	158	158	137	94	28	0	0	0	0
270.0	0	0	0	0	0	0	6	14	20	24	27	29	32	47	106	161	195	202	169	67	0	0	0	0
315.0	0	0	0	0	0	0	6	14	20	24	27	29	30	31	34	70	118	148	143	66	0	0	0	0
HORIZ	0	0	0	0	0	0	14	60	116	164	204	232	246	245	230	201	160	111	56	11	0	0	0	0

** AUG SOLAR HEAT GAIN FACTORS FOR 41.3 DEGS LATITUDE ** (NO SHADING OR LAGGING EFFECTS)

	12M	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
ALT	0.	0.	0.	0.	0.0	0.0	3.1	14.2	25.4	36.4	46.7	55.3	60.4	60.1	54.6	45.8	35.5	24.4	13.2	2.1	0.	0.	0.	0.
AZIM	0.	0.	0.	0.	0.0	0.0	-103.7	-94.0	-84.0	-72.7	-58.7	-39.6	-13.6	16.2	41.6	60.1	73.8	85.0	94.9	104.6	0.	0.	0.	0.
DNI	0	0	0	0	0	0	8	147	209	238	253	261	265	264	261	252	236	205	138	1	0	0	0	0
1.0	0	0	0	0	0	0	2	14	18	21	25	27	28	28	27	24	21	18	14	0	0	0	0	0
45.0	0	0	0	0	0	0	7	112	125	93	46	29	28	28	27	24	21	16	10	0	0	0	0	0
90.0	0	0	0	0	0	0	8	148	199	195	161	102	41	29	27	24	21	16	10	0	0	0	0	0
135.0	0	0	0	0	0	0	4	97	155	181	182	162	122	69	31	25	21	16	10	0	0	0	0	0
180.0	0	0	0	0	0	0	0	11	25	58	96	125	140	139	123	93	54	23	11	0	0	0	0	0
225.0	0	0	0	0	0	0	0	10	17	21	26	32	74	126	165	183	180	151	90	1	0	0	0	0
270.0	0	0	0	0	0	0	0	10	17	21	25	27	29	45	108	165	197	197	140	1	0	0	0	0
315.0	0	0	0	0	0	0	0	10	17	21	25	27	28	28	29	50	97	126	107	1	0	0	0	0
HORIZ	0	0	0	0	0	0	1	36	91	144	185	215	230	230	213	182	139	86	31	0	0	0	0	0

TABLE 11-116

** SEP SOLAR HEAT GAIN FACTORS FOR 41.3 DEGS LATITUDE ** (NO SHADING OR LAGGING EFFECTS)

	12M	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
ALT	0.	0.	0.	0.	0.0	0.0	0.0	0.1	17.2	27.0	36.9	44.2	48.2	48.0	43.7	36.2	26.8	16.2	5.1	0.0	0.	0.	0.	0.
AZIM	0.	0.	0.	0.	0.0	0.0	0.0	-84.6	-74.2	-62.6	-48.6	-31.2	-10.3	12.3	32.9	50.0	63.7	75.2	85.5	0.0	0.	0.	0.	0.
DNI	0	0	0	0	0	0	0	66	190	237	258	269	273	273	268	257	234	184	48	0	0	0	0	0
1.0	0	0	0	0	0	0	0	4	11	16	20	22	23	23	22	19	16	11	3	0	0	0	0	0
45.0	0	0	0	0	0	0	0	41	87	58	24	23	23	23	22	19	16	11	2	0	0	0	0	0
90.0	0	0	0	0	0	0	0	65	177	190	159	100	36	24	22	19	16	11	2	0	0	0	0	0
135.0	0	0	0	0	0	0	0	50	160	204	212	194	156	99	41	21	16	11	2	0	0	0	0	0
180.0	0	0	0	0	0	0	0	5	43	95	140	171	187	186	169	136	90	39	4	0	0	0	0	0
225.0	0	0	0	0	0	0	0	3	11	16	21	45	105	160	197	213	202	154	36	0	0	0	0	0
270.0	0	0	0	0	0	0	0	3	11	16	20	22	24	41	106	163	191	173	47	0	0	0	0	0
315.0	0	0	0	0	0	0	0	3	11	16	20	22	23	23	23	26	62	87	30	0	0	0	0	0
HORIZ	0	0	0	0	0	0	0	7	51	105	151	182	198	197	183	147	101	46	5	0	0	0	0	0

** OCT SOLAR HEAT GAIN FACTORS FOR 41.3 DEGS LATITUDE ** (NO SHADING OR LAGGING EFFECTS)

	12M	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
ALT	0.	0.	0.	0.	0.0	0.0	0.0	0.0	9.8	19.6	28.1	34.4	37.8	37.6	33.9	27.4	18.8	8.9	0.0	0.0	0.	0.	0.	0.
AZIM	0.	0.	0.	0.	0.0	0.0	0.0	0.0	-66.5	-55.2	-41.9	-26.3	-8.5	10.2	27.8	43.2	56.2	67.5	0.0	0.0	0.	0.	0.	0.
DNI	0	0	0	0	0	0	0	0	140	223	256	271	277	276	270	254	219	127	0	0	0	0	0	0
1.0	0	0	0	0	0	0	0	0	6	12	15	18	19	19	18	15	11	5	0	0	0	0	0	0
45.0	0	0	0	0	0	0	0	0	45	29	17	18	19	19	18	15	11	5	0	0	0	0	0	0
90.0	0	0	0	0	0	0	0	0	124	170	149	93	31	20	18	15	11	5	0	0	0	0	0	0
135.0	0	0	0	0	0	0	0	0	126	205	225	212	176	122	58	18	12	5	0	0	0	0	0	0
180.0	0	0	0	0	0	0	0	0	49	116	166	200	217	216	198	162	111	43	0	0	0	0	0	0
225.0	0	0	0	0	0	0	0	0	6	12	19	64	128	180	214	225	201	114	0	0	0	0	0	0
270.0	0	0	0	0	0	0	0	0	6	12	15	18	20	35	99	152	169	114	0	0	0	0	0	0
315.0	0	0	0	0	0	0	0	0	6	12	15	18	19	19	18	17	32	43	0	0	0	0	0	0
HORIZ	0	0	0	0	0	0	0	0	19	65	111	144	160	159	142	108	61	16	0	0	0	0	0	0

TABLE 11-117

** NOV SOLAR HEAT GAIN FACTORS FOR 41.3 DEGS LATITUDE ** (NO SHADING OR LAGGING EFFECTS)

	12M	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
ALT	0.	0.	0.	0.	0.0	0.0	0.0	0.0	3.1	12.3	20.0	25.6	28.5	28.4	25.2	19.4	11.5	0.0	0.0	0.0	0.	0.	0.	0.
AZIM	0.	0.	0.	0.	0.0	0.0	0.0	0.0	-60.0	-49.2	-36.9	-22.8	-7.3	8.7	24.1	38.0	50.2	0.0	0.0	0.0	0.	0.	0.	0.
DNI	0	0	0	0	0	0	0	0	24	183	238	260	269	269	259	235	174	0	0	0	0	0	0	0
1.0	0	0	0	0	0	0	0	0	1	8	12	14	15	15	14	11	7	0	0	0	0	0	0	0
45.0	0	0	0	0	0	0	0	0	5	11	12	14	15	15	14	11	7	0	0	0	0	0	0	0
90.0	0	0	0	0	0	0	0	0	20	130	128	81	26	16	14	11	7	0	0	0	0	0	0	0
135.0	0	0	0	0	0	0	0	0	22	172	217	214	183	135	73	21	8	0	0	0	0	0	0	0
180.0	0	0	0	0	0	0	0	0	11	111	173	213	232	231	210	169	104	0	0	0	0	0	0	0
225.0	0	0	0	0	0	0	0	0	1	8	24	79	139	187	215	215	165	0	0	0	0	0	0	0
270.0	0	0	0	0	0	0	0	0	1	8	12	14	16	30	87	131	126	0	0	0	0	0	0	0
315.0	0	0	0	0	0	0	0	0	1	8	12	14	15	15	14	12	12	0	0	0	0	0	0	0
HORIZ	0	0	0	0	0	0	0	0	2	30	69	101	117	116	98	66	26	0	0	0	0	0	0	0

** DEC SOLAR HEAT GAIN FACTORS FOR 41.3 DEGS LATITUDE ** (NO SHADING OR LAGGING EFFECTS)

	12M	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
ALT	0.	0.	0.	0.	0.0	0.0	0.0	0.0	0.5	9.4	16.8	22.1	24.9	24.8	21.7	16.2	8.6	0.0	0.0	0.0	0.	0.	0.	0.
AZIM	0.	0.	0.	0.	0.0	0.0	0.0	0.0	-57.5	-47.0	-35.1	-21.6	-6.9	8.3	22.9	36.2	48.0	0.0	0.0	0.0	0.	0.	0.	0.
DNI	0	0	0	0	0	0	0	0	0	155	227	255	265	265	253	223	144	0	0	0	0	0	0	0
1.0	0	0	0	0	0	0	0	0	0	6	10	12	13	13	12	9	5	0	0	0	0	0	0	0
45.0	0	0	0	0	0	0	0	0	0	7	10	12	13	13	12	9	5	0	0	0	0	0	0	0
90.0	0	0	0	0	0	0	0	0	0	106	117	75	23	14	12	9	5	0	0	0	0	0	0	0
135.0	0	0	0	0	0	0	0	0	0	147	207	211	183	137	77	23	6	0	0	0	0	0	0	0
180.0	0	0	0	0	0	0	0	0	0	99	171	213	233	232	211	166	90	0	0	0	0	0	0	0
225.0	0	0	0	0	0	0	0	0	0	6	27	83	141	186	212	205	136	0	0	0	0	0	0	0
270.0	0	0	0	0	0	0	0	0	0	6	10	12	14	27	80	119	100	0	0	0	0	0	0	0
315.0	0	0	0	0	0	0	0	0	0	6	10	12	13	13	12	10	7	0	0	0	0	0	0	0
HORIZ	0	0	0	0	0	0	0	0	0	18	52	82	98	97	80	49	15	0	0	0	0	0	0	0

TABLE 11-118

70 CARD OUTPUT TABLE (PRINT IS 24I4, FILE IS 24I3 FOR 41.1 DEG LAT (INCLUDING SHADE AND TRACKING, WHERE APPROPRIATE)

	12M	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
JANENOV, DIR= 1.0 DEG	0	0	0	0	0	0	0	0	0	3	6	10	12	14	14	13	10	6	3	1	0	0	0	0
JANENOV, DIR= 45.0 DEG	0	0	0	0	0	0	0	0	2	5	8	11	13	14	14	13	10	6	3	1	0	0	0	0
JANENOV, DIR= 90.0 DEG	0	0	0	0	0	0	0	0	8	60	84	89	78	52	29	15	10	6	3	1	0	0	0	0
JANENOV, DIR= 135.0 DEG	0	0	0	0	0	0	0	0	9	79	131	172	197	178	135	86	48	20	5	1	0	0	0	0
JANENOV, DIR= 180.0 DEG	0	0	0	0	0	0	0	0	5	50	99	149	197	220	222	204	165	97	55	21	1	0	0	0
JANENOV, DIR= 225.0 DEG	0	0	0	0	0	0	0	0	0	4	12	40	81	127	171	198	192	120	76	34	1	0	0	0
JANENOV, DIR= 270.0 DEG	0	0	0	0	0	0	0	0	0	3	6	10	13	20	48	81	102	70	52	26	1	0	0	0
JANENOV, DIR= 315.0 DEG	0	0	0	0	0	0	0	0	0	3	6	10	12	14	14	13	13	8	5	3	0	0	0	0
JANENOV, DIR= HORIZONTAL	0	0	0	0	0	0	0	0	0	3	11	25	42	59	75	86	87	78	63	46	28	14	4	0
JANENOV, DIR= DIFFUSE ONLY	0	0	0	0	0	0	0	0	0	3	6	10	12	14	14	13	10	6	3	1	0	0	0	0
FEBEOCT, DIR= 1.0 DEG	0	0	0	0	0	0	0	0	3	6	10	13	16	17	17	16	14	10	6	3	1	0	0	0
FEBEOCT, DIR= 45.0 DEG	0	0	0	0	0	0	0	0	20	21	21	25	20	17	17	16	14	10	6	3	1	0	0	0
FEBEOCT, DIR= 90.0 DEG	0	0	0	0	0	0	0	0	56	100	124	130	95	62	35	19	14	10	6	3	1	0	0	0
FEBEOCT, DIR= 135.0 DEG	0	0	0	0	0	0	0	0	58	117	166	205	205	175	125	78	44	19	6	3	1	0	0	0
FEBEOCT, DIR= 180.0 DEG	0	0	0	0	0	0	0	0	22	61	106	154	191	210	212	196	164	114	64	31	9	0	0	0
FEBEOCT, DIR= 225.0 DEG	0	0	0	0	0	0	0	0	3	6	11	34	73	119	166	202	212	181	110	65	24	0	0	0
FEBEOCT, DIR= 270.0 DEG	0	0	0	0	0	0	0	0	3	6	10	13	16	24	56	96	131	136	89	58	24	0	0	0
FEBEOCT, DIR= 315.0 DEG	0	0	0	0	0	0	0	0	3	6	10	13	16	17	17	17	23	31	18	15	9	0	0	0
FEBEOCT, DIR= HORIZONTAL	0	0	0	0	0	0	0	0	2	9	24	44	68	92	115	130	131	119	98	74	49	28	11	2
FEBEOCT, DIR= DIFFUSE ONLY	0	0	0	0	0	0	0	0	3	6	10	13	16	17	17	16	14	10	6	3	1	0	0	0
MARESEP, DIR= 1.0 DEG	0	0	0	0	0	0	0	2	5	9	13	17	20	21	21	20	18	14	10	5	3	1	0	0
MARESEP, DIR= 45.0 DEG	0	0	0	0	0	0	0	21	48	52	48	42	29	22	21	20	18	14	9	5	2	0	0	0
MARESEP, DIR= 90.0 DEG	0	0	0	0	0	0	0	33	95	136	160	150	105	67	39	22	18	14	9	5	2	0	0	0
MARESEP, DIR= 135.0 DEG	0	0	0	0	0	0	0	26	84	135	179	201	190	155	106	66	37	19	9	5	2	0	0	0
MARESEP, DIR= 180.0 DEG	0	0	0	0	0	0	0	3	20	51	89	129	161	179	181	167	137	96	55	27	9	1	0	0
MARESEP, DIR= 225.0 DEG	0	0	0	0	0	0	0	1	5	9	14	27	60	102	146	184	203	193	135	82	41	9	0	0
MARESEP, DIR= 270.0 DEG	0	0	0	0	0	0	0	1	5	9	13	17	20	28	61	104	146	171	133	87	48	12	0	0
MARESEP, DIR= 315.0 DEG	0	0	0	0	0	0	0	1	5	9	13	17	20	21	21	23	39	60	51	38	25	7	0	0
MARESEP, DIR= HORIZONTAL	1	0	0	0	0	0	0	1	6	20	41	68	97	128	155	172	174	160	135	105	74	46	23	8
MARESEP, DIR= DIFFUSE ONLY	0	0	0	0	0	0	0	1	5	9	13	17	20	21	21	20	18	14	9	5	2	0	0	0
APREAUG, DIR= 1.0 DEG	0	0	0	0	0	0	0	6	9	14	19	22	24	25	25	25	22	20	17	9	6	3	0	0
APREAUG, DIR= 45.0 DEG	0	0	0	0	0	0	2	50	77	87	83	62	42	29	26	25	22	19	15	8	5	2	0	0
APREAUG, DIR= 90.0 DEG	0	0	0	0	0	0	3	67	118	156	178	154	107	70	43	27	22	19	15	8	5	2	0	0
APREAUG, DIR= 135.0 DEG	0	0	0	0	0	0	1	44	89	131	167	174	157	122	82	53	32	20	15	8	5	2	0	0
APREAUG, DIR= 180.0 DEG	0	0	0	0	0	0	0	4	12	32	60	90	116	132	134	120	94	63	38	17	6	2	0	0
APREAUG, DIR= 225.0 DEG	0	0	0	0	0	0	0	4	8	13	19	24	46	80	117	152	172	172	143	85	49	19	0	0
APREAUG, DIR= 270.0 DEG	0	0	0	0	0	0	0	4	8	13	18	22	24	33	64	105	147	179	174	108	69	29	0	0
APREAUG, DIR= 315.0 DEG	0	0	0	0	0	0	0	4	8	13	18	22	24	25	26	35	60	87	100	66	47	22	0	0
APREAUG, DIR= HORIZONTAL	4	0	0	0	0	0	0	4	14	33	59	91	125	160	188	203	205	192	167	133	98	66	38	17
APREAUG, DIR= DIFFUSE ONLY	0	0	0	0	0	0	0	4	8	13	18	22	24	25	25	25	22	19	15	8	5	2	0	0

TABLE 11-119

TO CARD OUTPUT TABLE (POSITIVE VALUES ONLY) FOR 45.0 DEG LAT (INCLUDING SHADE AND BACKING, WHERE APPROPRIATE)

	12M	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
MAY&JUL, DIR= 1.0 DEG	0	0	0	0	0	0	11	18	20	25	26	26	27	28	28	28	26	24	27	25	15	10	4	0
MAY&JUL, DIR= 45.0 DEG	0	0	0	0	0	0	33	77	106	120	106	76	53	36	29	28	26	23	19	12	7	3	1	0
MAY&JUL, DIR= 90.0 DEG	0	0	0	0	0	0	34	90	137	172	179	151	106	71	45	30	26	23	19	12	7	3	1	0
MAY&JUL, DIR= 135.0 DEG	0	0	0	0	0	0	15	50	87	123	146	148	130	98	68	46	30	23	19	12	7	3	1	0
MAY&JUL, DIR= 180.0 DEG	0	0	0	0	0	0	2	7	12	23	42	63	82	95	96	85	65	45	29	15	8	3	1	0
MAY&JUL, DIR= 225.0 DEG	0	0	0	0	0	0	2	7	12	17	22	26	38	64	95	125	146	149	130	90	52	24	6	0
MAY&JUL, DIR= 270.0 DEG	0	0	0	0	0	0	2	7	12	17	22	25	28	36	65	104	144	177	182	140	86	46	13	0
MAY&JUL, DIR= 315.0 DEG	0	0	0	0	0	0	2	7	12	17	22	25	27	29	30	46	75	105	126	107	70	41	13	0
MAY&JUL, DIR= HORIZONTAL	10	1	0	0	0	0	1	8	22	45	73	107	144	179	206	220	222	210	186	152	116	81	50	26
MAY&JUL, DIR= DIFFUSE ONLY	0	0	0	0	0	0	2	7	12	17	22	25	27	28	28	28	26	23	19	12	7	3	1	0
JUN , DIR= 1.0 DEG	0	0	0	0	0	0	16	24	26	32	30	28	29	29	29	29	28	27	33	34	20	15	7	0
JUN , DIR= 45.0 DEG	0	0	0	0	0	0	42	85	115	131	114	82	58	39	31	29	27	24	20	14	8	4	1	0
JUN , DIR= 90.0 DEG	0	0	0	0	0	0	43	95	140	174	177	148	104	71	46	31	27	24	20	14	8	4	1	0
JUN , DIR= 135.0 DEG	0	0	0	0	0	0	17	49	83	116	136	136	118	88	63	43	30	24	20	14	8	4	1	0
JUN , DIR= 180.0 DEG	0	0	0	0	0	0	3	8	14	22	36	53	69	80	81	71	55	40	27	16	9	4	1	0
JUN , DIR= 225.0 DEG	0	0	0	0	0	0	3	8	13	19	24	28	37	59	87	114	134	138	122	87	50	25	7	0
JUN , DIR= 270.0 DEG	0	0	0	0	0	0	3	8	13	19	24	26	29	37	65	103	142	174	182	149	91	52	18	0
JUN , DIR= 315.0 DEG	0	0	0	0	0	0	3	8	13	19	24	26	28	30	33	51	81	112	135	123	78	48	18	0
JUN , DIR= HORIZONTAL	12	3	0	0	0	0	2	10	26	49	79	113	150	185	211	225	226	215	191	159	122	87	55	30
JUN , DIR= DIFFUSE ONLY	0	0	0	0	0	0	3	8	13	19	24	26	28	29	29	29	27	24	20	14	8	4	1	0
DEC , DIR= 1.0 DEG	0	0	0	0	0	0	0	0	0	3	5	8	11	12	12	11	9	5	3	1	0	0	0	0
DEC , DIR= 45.0 DEG	0	0	0	0	0	0	0	0	0	3	6	8	11	12	12	11	9	5	3	1	0	0	0	0
DEC , DIR= 90.0 DEG	0	0	0	0	0	0	0	0	0	45	70	75	67	47	27	13	9	5	3	1	0	0	0	0
DEC , DIR= 135.0 DEG	0	0	0	0	0	0	0	0	0	62	115	157	186	174	135	86	48	20	6	1	0	0	0	0
DEC , DIR= 180.0 DEG	0	0	0	0	0	0	0	0	0	42	91	142	191	217	220	200	156	90	49	17	0	0	0	0
DEC , DIR= 225.0 DEG	0	0	0	0	0	0	0	0	0	3	12	41	82	127	168	190	174	107	66	26	0	0	0	0
DEC , DIR= 270.0 DEG	0	0	0	0	0	0	0	0	0	3	5	8	11	18	44	73	86	58	42	19	0	0	0	0
DEC , DIR= 315.0 DEG	0	0	0	0	0	0	0	0	0	3	5	8	11	12	12	12	10	6	3	1	0	0	0	0
DEC , DIR= HORIZONTAL	0	0	0	0	0	0	0	0	0	2	8	19	33	47	60	69	70	63	51	36	22	10	2	0
DEC , DIR= DIFFUSE ONLY	0	0	0	0	0	0	0	0	0	3	5	8	11	12	12	11	9	5	3	1	0	0	0	0

TABLE 11-120

0	0	0	0	0	0	16	24	26	32	30	28	29	29	29	29	28	27	33	34	20	15	7	0V41.3,11
0	0	0	0	0	0	42	85	115	131	114	82	58	39	31	29	27	24	20	14	8	4	1	0V41.3,12
0	0	0	0	0	0	43	95	143	174	177	140	104	71	46	31	27	24	20	14	8	4	1	0V41.3,13
0	0	0	0	0	0	17	49	83	116	136	136	118	88	63	43	30	24	20	14	8	4	1	0V41.3,14
0	0	0	0	0	0	3	8	14	22	36	53	69	80	81	71	55	40	27	16	9	4	1	0V41.3,15
0	0	0	0	0	0	3	8	13	19	24	28	37	59	87	114	134	139	122	87	50	25	7	0V41.3,16
0	0	0	0	0	0	3	8	13	19	24	26	29	37	65	103	142	174	182	149	91	52	18	0V41.3,17
0	0	0	0	0	0	3	8	13	19	24	26	28	30	33	51	81	112	135	123	78	48	18	0V41.3,18
12	3	0	0	0	0	2	10	26	49	79	113	150	185	211	225	226	215	191	159	122	87	55	30V41.3,19
0	0	0	0	0	0	11	18	20	25	26	26	27	28	28	28	26	24	27	25	15	10	4	0V41.3,21
0	0	0	0	0	0	33	77	106	120	106	76	53	36	29	26	26	23	19	12	7	3	1	0V41.3,22
0	0	0	0	0	0	34	90	137	172	179	151	106	71	45	30	26	23	19	12	7	3	1	0V41.3,23
0	0	0	0	0	0	15	50	87	123	146	148	130	98	68	46	30	23	19	12	7	3	1	0V41.3,24
0	0	0	0	0	0	2	7	12	23	42	63	82	95	96	85	65	45	29	15	8	3	1	0V41.3,25
0	0	0	0	0	0	2	7	12	17	22	26	38	64	95	125	146	149	130	90	52	24	6	0V41.3,26
0	0	0	0	0	0	2	7	12	17	22	25	28	36	65	104	144	177	182	140	86	46	13	0V41.3,27
0	0	0	0	0	0	2	7	12	17	22	25	27	29	30	46	75	105	126	107	70	41	13	0V41.3,28
10	1	0	0	0	0	1	8	22	45	73	107	144	179	206	220	222	210	186	152	116	81	50	26V41.3,29
0	0	0	0	0	0	0	6	9	14	19	22	24	25	25	25	22	20	17	9	6	3	0	0V41.3,31
0	0	0	0	0	0	2	50	77	87	83	62	42	29	26	25	22	19	15	8	5	2	0	0V41.3,32
0	0	0	0	0	0	3	67	118	156	178	154	107	70	43	27	22	19	15	8	5	2	0	0V41.3,33
0	0	0	0	0	0	1	44	89	131	167	174	157	122	82	53	32	20	15	8	5	2	0	0V41.3,34
0	0	0	0	0	0	0	4	12	32	60	90	116	132	134	120	94	63	38	17	6	2	0	0V41.3,35
0	0	0	0	0	0	0	0	4	8	13	19	24	46	80	117	152	172	172	143	85	49	19	0 0V41.3,36
0	0	0	0	0	0	0	4	8	13	18	22	24	33	64	105	147	179	174	108	69	29	0	0V41.3,37
0	0	0	0	0	0	0	4	8	15	18	22	24	25	26	35	60	87	100	66	47	22	0	0V41.3,38
4	0	0	0	0	0	0	4	14	33	59	91	125	160	188	203	205	192	167	133	98	66	38	17V41.3,39
0	0	0	0	0	0	0	2	5	9	13	17	20	21	21	20	18	14	10	5	3	1	0	0V41.3,41
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0	0	0	0	0	0	0	33	95	136	160	150	105	67	39	22	18	14	9	5	2	0	0	0V41.3,43
0	0	0	0	0	0	0	26	84	135	179	201	190	155	106	66	37	19	9	5	.	0	0	0V41.3,44
0	0	0	0	0	0	0	3	20	51	89	129	161	179	181	167	137	96	55	27	9	1	0	0V41.3,45
0	0	0	0	0	0	0	1	5	9	14	27	60	102	146	184	203	193	135	82	41	9	0	0V41.3,46
0	0	0	0	0	0	0	1	5	9	13	17	20	28	61	104	146	171	133	87	46	12	0	0V41.3,47
0	0	0	0	0	0	0	1	5	9	13	17	20	21	21	23	39	65	51	38	25	7	0	0V41.3,48
1	0	0	0	0	0	0	1	6	20	41	68	97	123	155	172	174	165	135	105	74	46	23	8V41.3,49
0	0	0	0	0	0	0	0	3	6	10	13	16	17	17	16	14	10	6	3	1	0	0	0V41.3,51
0	0	0	0	0	0	0	0	20	21	21	25	20	17	17	16	14	10	6	3	1	0	0	0V41.3,52
0	0	0	0	0	0	0	0	56	100	124	130	95	62	35	19	14	10	6	3	1	0	0	0V41.3,53
0	0	0	0	0	0	0	0	58	117	166	205	205	175	126	78	44	19	6	3	1	0	0	0V41.3,54
0	0	0	0	0	0	0	0	22	61	106	154	191	210	212	196	164	114	64	31	9	0	0	0V41.3,55
0	0	0	0	0	0	0	0	3	6	11	34	73	119	166	202	212	181	110	65	24	0	0	0V41.3,56
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0	0	0	0	0	0	0	0	2	9	24	44	68	92	115	130	131	119	98	74	49	28	11	2V41.3,59
0	0	0	0	0	0	0	0	0	3	6	10	12	14	14	13	10	6	3	1	0	0	0	0V41.3,61
0	0	0	0	0	0	0	0	2	5	8	11	13	14	14	13	10	6	3	1	0	0	0	0V41.3,62
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0	0	0	0	0	0	0	0	9	79	131	172	197	178	135	86	48	20	5	1	0	0	0	0V41.3,64
0	0	0	0	0	0	0	0	5	50	99	149	197	220	222	204	165	97	55	21	1	0	0	0V41.3,65
0	0	0	0	0	0	0	0	0	4	12	40	81	127	171	198	192	120	76	34	1	0	0	0V41.3,66
0	0	0	0	0	0	0	0	0	3	6	10	13	20	48	81	102	70	52	26	1	0	0	0V41.3,67
0	0	0	0	0	0	0	0	0	3	6	10	12	14	14	13	13	8	5	3	0	0	0	0V41.3,68
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0	0	0	0	0	0	0	0	0	3	5	8	11	12	12	11	9	5	3	1	0	0	0	0V41.3,71
0	0	0	0	0	0	0	0	0	3	6	8	11	12	12	11	9	5	3	1	0	0	0	0V41.3,72
0	0	0	0	0	0	0	0	0	45	70	75	67	47	27	13	9	5	3	1	0	0	0	0V41.3,73
0	0	0	0	0	0	0	0	0	62	115	157	186	174	135	86	48	20	6	1	0	0	0	0V41.3,74
0	0	0	0	0	0	0	0	0	42	91	142	191	217	220	200	156	90	49	17	0	0	0	0V41.3,75
0	0	0	0	0	0	0	0	0	3	12	41	82	127	168	198	174	157	66	26	0	0	0	0V41.3,76
0	0	0	0	0	0	0	0	0	3	5	8	11	18	44	73	86	53	42	19	0	0	0	0V41.3,77
0	0	0	0	0	0	0	0	0	3	5	8	11	12	12	12	10	6	3	1	0	0	0	0V41.3,78

TABLE 11-121

```
A41.3, 1     47 176 214 190  97 190 214 176 267
A41.3, 2     38 170 220 174 111 174 220 170 268
A41.3, 3     36 196 227 196 192 196 227 196 252
A41.3, 4     32  98 208 227 204 227 208  98 215
A41.3, 5     27  56 190 248 230 248 190  56 180
A41.3, 6     23  29 147 230 246 230 147  29 129
A41.3, 7     22  22 125 213 243 213 125  22 111
SLK440       36 163 216 170 159 170 216 163 262
Z41.3, 1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
Z41.3, 2  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
Z41.3, 3  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
Z41.3, 4  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
Z41.3, 5  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
Z41.3, 6  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
Z41.3, 7  0  0  0  0  0  0  3 77  8 70 10 68  9 70  3 76  0  0  0  0  0  0  0
Z41.3, 8  0  0  0  0  6 95 14 87 19 80 21 77 19 79 14 86  6 95  0  0  0  0  0
Z41.3, 9  3120 10114 17106 25 97 30 89 32 86 31 89 25 96 17106 10113  3120  0  0
Z41.3,10 12131 19125 28117 36108 41100 44 96 42 99 36107 28117 20125 12131  9133
Z41.3,11 20143 28138 37131 46122 52113 55109 53112 47121 37131 28138 20143 17145
Z41.3,12 25157 34154 44149 55141 62132 64128 62132 55140 44149 34154 26157 22158
Z41.3,13 28173 37172 48170 60167 68163 71160 68162 60166 48170 38171 29173 25173
Z41.3,14 28189 37190 48192 59196 68200 71203 68201 60196 48192 38190 28189 25188
Z41.3,15 25204 34208 44213 54221 61230 64234 61230 55222 44213 34208 25204 22203
Z41.3,16 19218 27223 36230 45239 51248 54253 52249 46240 36230 27223 19218 16216
Z41.3,17 11230 19236 27244 35253 42261 43265 41262 35254 27244 19236 12230  9228
Z41.3,18  2241  9247 16255 24264 29272 31275 30272 24265 16255  9247  0  0  0  0
Z41.3,19  0  0  0  0  5265 13274 18281 20284 18282 13275  5265  0  0  0  0  0  0
Z41.3,20  0  0  0  0  0  0  2284  7290  9293  8291  2285  0  0  0  0  0  0  0  0
Z41.3,21  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
Z41.3,22  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
Z41.3,23  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
Z41.3,24  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
  2  2  2  2  2  2  2  6  9  9 10 10 11 12 11 11 11 11 10 10  9  6  3  2T41.3,11
  7  6  5  4  4  3  3  2  3  5  6  6  7  8  9  9 10 10 10 11 11 11  9  8T41.3,12
  9  9  8  8  7  6  6  6  5  5  5  5  5  5  6  6  7  7  7  8  9  9  9  9T41.3,13
  8  8  8  8  7  7  7  7  7  6  6  6  6  6  6  6  7  7  7  7  7  8  8  8T41.3,14
  2  2  2  2  2  4  4 16 30 37 37 31 24 20 16 15 14 12 11  8  6  5  3  3T41.3,21
  8  7  6  5  4  3  3  3  6 11 16 20 22 23 22 21 20 19 18 16 14 13 11  9T41.3,22
 14 13 13 12 10  9  9  8  8  8  8 10 11 12 14 15 16 17 17 17 17 16 16 15T41.3,23
 14 13 13 13 12 12 11 11 11 11 10 10 12 12 12 13 13 14 14 15 15 15 15 14T41.3,24
  3  3  2  2  2  1  4 18 36 48 53 51 42 32 23 19 17 14 13  9  7  6  4  3T41.3,31
 11  9  8  7  6  5  4  4  7 14 20 27 31 34 33 31 29 27 24 22 19 17 15 12T41.3,32
 19 18 17 16 14 13 12 11 10 11 11 13 14 17 19 21 23 24 23 23 23 22 22 20T41.3,33
 19 19 18 18 17 16 16 15 15 14 14 14 16 16 17 18 19 19 20 20 20 20 20 19T41.3,34
  3  3  2  2  2  1  3 11 23 34 43 46 44 39 30 23 19 15 13 10  7  6  4  3T41.3,41
 11 10  8  7  6  5  4  4  5 10 14 20 24 29 31 31 30 27 25 23 20 18 15 13T41.3,42
 19 18 17 16 14 13 12 11 10 10 10 11 12 14 16 18 20 22 22 22 22 22 21 20T41.3,43
 18 18 17 17 16 16 15 14 14 14 13 13 14 15 15 16 17 18 18 18 19 19 19 18T41.3,44
  3  2  2  2  2  1  2  2  4  8 14 21 28 33 34 33 29 22 17 11  8  6  4  3T41.3,51
 11 10  8  7  6  5  4  4  4  4  5  7  9 13 17 20 23 24 24 22 20 18 15 13T41.3,52
 16 15 15 14 12 11 11  9  9  9  8  8  7  7  8 10 11 14 15 16 17 17 17 16T41.3,53
 14 14 14 13 13 13 12 12 11 11 10 10 10 10 10 11 11 12 13 13 14 14 14 14T41.3,54
  6  4  4  4  3  2  3  3  5  6  9 10 13 21 30 39 45 47 45 35 23 14  9  7T41.3,61
 21 18 15 13 11  9  8  7  6  6  6  7  7  9 12 15 20 25 30 32 33 31 28 24T41.3,62
 23 23 22 20 19 17 17 15 14 14 12 12 11 10 10 10 11 13 15 16 19 21 23 23T41.3,63
 19 19 19 19 18 18 17 17 17 16 15 15 14 14 14 13 14 14 15 16 16 17 18 18T41.3,64
  7  5  5  4  4  3  3  3  5  7  9 10 11 13 21 32 44 52 56 48 32 19 12  9T41.3,71
 24 21 18 15 13 11  9  8  7  7  7  7  7  9 10 12 16 21 28 33 36 35 32 28T41.3,72
 25 25 24 23 21 20 19 17 16 15 14 13 12 11 11 11 11 13 14 15 19 21 24 24T41.3,73
 20 20 20 20 20 19 19 18 18 17 17 16 16 15 15 14 14 15 15 16 16 18 19 19T41.3,74
  5  4  4  3  3  2  2  3  5  6  8 10 10 12 12 17 26 34 41 38 25 15  9  6T41.3,81
 18 15 13 11  9  8  7  6  5  6  6  6  6  8  9  9 11 14 18 23 25 25 23 20T41.3,82
 18 18 17 16 15 14 14 12 11 11 10 10  9  9  8  8  9 10 10 11 13 15 17 17T41.3,83
 14 14 15 15 14 14 14 13 13 13 12 12 11 11 11 11 11 11 11 12 12 13 13 14T41.3,84
  6  4  1  0  0  0  0  1  3 11 21 32 42 51 58 62 63 60 54 46 33 23 15 10R41.3,11
  6  4  1  0  0  0  0  1  3 11 21 32 42 51 58 62 63 60 54 46 33 23 15 10R41.3,12
 32 28 24 21 19 16 13 11  9  8  8  9 11 17 22 28 32 37 40 42 41 42 38 35R41.3,13
 26 23 21 19 16 15 13 12 11 12 14 16 20 24 28 33 36 38 39 38 36 34 32 29R41.3,14
 26 23 21 19 16 15 13 12 11 12 14 16 20 24 28 33 36 38 39 38 36 34 32 29R41.3,15
  1 -6-13-20-25-29-34-37-39-39-36-31-23-13 -3  8 17 23 28 29 27 22 16  9R41.3,21
  9  3 -3 -9-15-20-25-29-33-35-35-33-29-23-15 -6  3 11 17 21 23 22 19 15R41.3,22
  7  5  2 -1 -4 -8-11-15-18-21-23-23-23-21-18-14-10 -5 -1  3  6  8  9  8R41.3,23
  2  1  1  0 -1 -1 -1  0  2  5  8 12 15 18 19 20 19 18 16 12 10  8  6  4OTD20
```

TABLE 11-122

0	0	0	0	0	0	0	0	0	1	6	10	12	14	14	13	10	6	3	1	0	0	0	0M1,11D 1
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0	0	0	0	0	0	0	0	8	60	84	89	78	52	29	15	10	6	3	1	0	0	0	0M1,11D 3
0	0	0	0	0	0	0	0	9	79	131	172	197	178	135	86	48	20	5	1	0	0	0	0M1,11D 4
0	0	0	0	0	0	0	0	5	50	99	149	197	220	222	204	165	97	55	21	1	0	0	0M1,11D 5
0	0	0	0	0	0	0	0	0	4	12	40	81	127	171	198	192	120	76	34	1	0	0	0M1,11D 6
0	0	0	0	0	0	0	0	0	3	6	10	13	20	48	81	102	70	52	26	1	0	0	0M1,11D 7
0	0	0	0	0	0	0	0	0	3	6	10	12	14	14	13	13	8	5	1	0	0	0	0M1,11D 8
0	0	0	0	0	0	0	0	0	3	11	25	42	59	75	86	87	78	63	46	28	14	4	0M1,11D 9
0	0	0	0	0	0	0	0	0	3	6	10	12	14	14	13	10	6	3	1	0	0	0	0M1,11D10
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0	0	0	0	0	0	0	0	20	21	21	25	20	17	17	16	14	10	6	3	1	0	0	0M2,10D 2
0	0	0	0	0	0	0	0	56	100	124	130	95	62	35	19	14	10	6	3	1	0	0	0M2,10D 3
0	0	0	0	0	0	0	0	58	117	166	205	205	175	126	78	44	19	6	3	1	0	0	0M2,10D 4
0	0	0	0	0	0	0	0	22	61	106	154	191	210	212	196	164	114	64	31	9	0	0	0M2,10D 5
0	0	0	0	0	0	0	0	3	6	11	34	73	119	166	202	212	181	110	65	24	0	0	0M2,10D 6
0	0	0	0	0	0	0	0	3	6	10	13	16	24	56	96	131	136	89	58	24	0	0	0M2,10D 7
0	0	0	0	0	0	0	0	3	6	10	13	16	17	17	17	23	31	18	15	9	0	0	0M2,10D 8
0	0	0	0	0	0	0	0	2	9	24	44	68	92	115	130	131	119	98	74	49	28	11	2M2,10D 9
0	0	0	0	0	0	0	0	3	6	10	13	16	17	17	16	14	10	6	3	1	0	0	0M2,10D10
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0	0	0	0	0	0	0	33	95	136	160	150	105	67	39	22	18	14	9	5	2	0	0	0M 3,9D 3
0	0	0	0	0	0	0	26	84	135	179	201	190	155	106	66	37	19	9	5	2	0	0	0M 3,9D 4
0	0	0	0	0	0	0	3	20	51	89	129	161	179	181	167	137	96	55	27	9	1	0	0M 3,9D 5
0	0	0	0	0	0	0	1	5	9	14	27	60	102	146	184	203	193	135	82	41	9	0	0M 3,9D 6
0	0	0	0	0	0	0	1	5	9	13	17	20	28	61	104	146	171	133	87	48	12	0	0M 3,9D 7
0	0	0	0	0	0	0	1	5	9	13	17	20	21	21	23	39	60	51	38	25	7	0	0M 3,9D 8
1	0	0	0	0	0	0	1	6	20	41	68	97	124	155	172	174	160	135	105	74	46	23	8M 3,9D 9
0	0	0	0	0	0	0	1	5	9	13	17	20	21	21	20	18	14	9	5	2	0	0	0M 3,9D10
0	0	0	0	0	0	0	6	9	14	19	22	24	25	25	25	22	20	17	9	6	3	0	0M 4,8D 1
0	0	0	0	0	0	2	50	77	87	83	62	42	29	26	25	22	19	15	8	5	2	0	0M 4,8D 2
0	0	0	0	0	0	3	67	118	156	178	154	107	70	43	27	22	19	15	8	5	2	0	0M 4,8D 3
0	0	0	0	0	0	1	44	89	131	167	174	157	122	82	53	32	20	15	8	5	2	0	0M 4,8D 4
0	0	0	0	0	0	0	4	12	32	60	90	116	132	134	120	94	63	38	17	6	2	0	0M 4,8D 5
0	0	0	0	0	0	0	4	8	13	19	24	46	80	117	152	172	172	143	85	49	19	0	0M 4,8D 6
0	0	0	0	0	0	0	4	8	13	18	22	24	33	64	105	147	179	174	103	69	29	0	0M 4,8D 7
0	0	0	0	0	0	0	4	8	13	18	22	24	25	26	35	60	87	100	66	47	22	0	0M 4,8D 8
4	0	0	0	0	0	0	4	14	33	59	91	125	160	188	203	205	192	167	133	98	66	38	17M 4,8D 9
0	0	0	0	0	0	0	4	8	13	18	22	24	25	25	25	22	19	15	8	5	2	0	0M 4,8D10
0	0	0	0	0	0	11	18	20	25	26	26	27	28	28	28	26	24	27	25	15	10	4	0M 5,7D 1
0	0	0	0	0	0	33	77	106	120	106	76	53	36	29	28	26	23	19	12	7	3	1	0M 5,7D 2
0	0	0	0	0	0	34	90	137	172	179	151	106	71	45	30	26	23	19	12	7	3	1	0M 5,7D 3
0	0	0	0	0	0	15	50	87	123	146	148	130	98	68	46	30	23	19	12	7	3	1	0M 5,7D 4
0	0	0	0	0	0	2	7	12	23	42	63	82	95	96	85	65	45	29	15	8	3	1	0M 5,7D 5
0	0	0	0	0	0	2	7	12	17	22	26	38	64	95	125	146	149	130	90	52	24	6	0M 5,7D 6
0	0	0	0	0	0	2	7	12	17	22	25	28	36	65	104	144	177	182	143	86	46	13	0M 5,7D 7
0	0	0	0	0	0	2	7	12	17	22	25	27	29	30	46	75	105	126	107	70	41	13	0M 5,7D 8
10	1	0	0	0	0	1	8	22	45	73	107	144	179	206	220	222	210	186	152	116	81	50	26M 5,7D 9
0	0	0	0	0	0	2	7	12	17	22	25	27	28	28	28	26	23	19	12	7	3	1	0M 5,7D10
0	0	0	0	0	0	16	24	26	32	30	28	29	29	29	29	28	27	33	34	20	15	7	0M 6D 1
0	0	0	0	0	0	42	89	115	131	114	82	58	39	31	29	27	24	20	14	8	4	1	0M 6D 2
0	0	0	0	0	0	43	95	140	174	177	148	104	71	46	31	27	24	20	14	8	4	1	0M 6D 3
0	0	0	0	0	0	17	49	83	116	136	136	118	88	63	43	30	24	20	14	8	4	1	0M 6D 4
0	0	0	0	0	0	3	8	14	22	36	53	69	80	81	71	55	40	27	16	9	4	1	0M 6D 5
0	0	0	0	0	0	3	8	13	19	24	28	37	59	87	114	134	138	122	87	50	25	7	0M 6D 6
0	0	0	0	0	0	3	8	13	19	24	26	29	37	65	103	142	174	182	149	91	52	18	0M 6D 7
0	0	0	0	0	0	3	8	13	19	24	26	28	30	33	51	81	112	135	123	78	48	18	0M 6D 8
12	3	0	0	0	0	2	10	26	49	79	113	150	185	211	225	226	215	191	159	122	87	55	30M 6D 9
0	0	0	0	0	0	3	8	13	19	24	26	28	29	29	29	27	24	20	14	8	4	1	0M 6D10
0	0	0	0	0	0	0	0	0	3	5	8	11	12	12	11	9	5	3	1	0	0	0	0M 12D 1
0	0	0	0	0	0	0	0	0	3	6	8	11	12	12	11	9	5	3	1	0	0	0	0M 12D 2
0	0	0	0	0	0	0	0	0	45	70	75	67	47	27	15	9	5	3	1	0	0	0	0M 12D 3
[illegible]																							
0	0	0	0	0	0	0	0	0	42	91	142	191	217	220	200	156	98	49	17	0	0	0	0M 12D 5
0	0	0	0	0	0	0	0	0	4	12	41	82	127	160	180	179	147	86	26	0	0	0	0M 12D 6
[illegible]																							
0	0	0	0	0	0	0	0	0	3	5	8	11	12	12	12	10	6	3	1	0	0	0	0M 12D 8
0	0	0	0	0	0	0	0	0	2	8	19	33	47	60	69	70	63	51	36	22	10	2	0M 12D 9
0	0	0	0	0	0	0	0	0	3	5	8	11	12	12	11	9	5	3	1	0	0	0	0M 12D10

TABLE 11-123

```
[illegible]                                                    [illegible]   [illegible]   [illegible]   [illegible]
PANLET                                                         10.0          14.03.18      1             019955

                                    PANVALET
                THE PROGRAM MANAGEMENT AND SECURITY SYSTEM

        PROGRAMS AND ALL SUPPORTING MATERIALS COPYRIGHT 1975 BY PANSOPHIC SYSTEMS, INCORPORATED

**INSERT WORK
      INTEGER W1(24),W2(24),S1(24),S2(24)
      REAL CARD(20)
      READ(5,1) IWDB,IWOP,ISDB,ISOP,IDU
  1   FORMAT(5I5)
      DO 7 I=1,24
      W1(I)=IWDB
      W2(I)=IWOP
      S1(I)=ISDB
      IF(I.EQ.1) S1(I)=S1(I)-IDU
      S2(I)=ISOP
  7   CONTINUE
  10  READ(3,2,END=11) CARD
      WRITE(1,2) CARD
  2   FORMAT(20A4)
      GO TO 10
  11  DO 16 I=1,2
  16  WRITE(1,3) W1,W2
  3   FORMAT(24I3/24I3/)
      DO 17 I=1,10
  17  WRITE(1,3) S1,S2
      STOP
      END
***** ABOVE ACTION SATISFACTORILY COMPLETED *****
```

TABLE 11-124

```
FORTRAN IV G1  RELEASE 2.0          MAIN          DATE = 79038          14/08/23          PAGE 0001

0001                INTEGER W1(24),W2(24),S1(24),S2(24)
0002                REAL CARD(20)
0003                READ(5,1) IWDB,IWDP,ISDB,ISDP,IDU
0004            1   FORMAT(5I5)
0005                DO 7 I=1,24
0006                W1(I)=IWDB
0007                W2(I)=IWDP
0008                S1(I)=ISDB
0009                IF(I.EQ.1) S1(I)=S1(I)-IDU
0010                S2(I)=ISDP
0011            7   CONTINUE
0012           10   READ(3,2,END=11) CARD
0013                WRITE(1,2) CARD
0014            2   FORMAT(20A4)
0015                GO TO 10
0016           11   DO 16 I=1,2
0017           16   WRITE(1,3) W1,W2
0018            3   FORMAT(24I3/24I3/)
0019                DO 17 I=1,10
0020           17   WRITE(1,3) S1,S2
0021                STOP
0022                END

FORTRAN IV G1  RELEASE 2.0          MAIN          DATE = 79038          14/08/23          PAGE 0002

                              SUBPROGRAMS CALLED
SYMBOL    LOCATION    SYMBOL    LOCATION    SYMBOL    LOCATION    SYMBOL    LOCATION    SYMBOL    LOCATION
IBCOM       B0

                                SCALAR MAP
SYMBOL    LOCATION    SYMBOL    LOCATION    SYMBOL    LOCATION    SYMBOL    LOCATION    SYMBOL    LOCATION
IWDB        B4        IWDP        B8        ISDB        BC        ISDP        C0        IDU         C4
I           C8

                                ARRAY MAP
SYMBOL    LOCATION    SYMBOL    LOCATION    SYMBOL    LOCATION    SYMBOL    LOCATION    SYMBOL    LOCATION
W1          CC        W2         12C        S1         18C        S2         1EC        CARD       24C

                              FORMAT STATEMENT MAP
SYMBOL    LOCATION    SYMBOL    LOCATION    SYMBOL    LOCATION    SYMBOL    LOCATION    SYMBOL    LOCATION
    1       29C           2       2A2           3       2A8

                             STATEMENT LABEL MAP
LOCATION   STA NUM   LABEL     LOCATION   STA NUM   LABEL     LOCATION   STA NUM   LABEL
 00031C       3                 000358       5                 000364       6
 00036C       7                 000374       8                 00037C       9
 000396      10                 00039E      11       7        000386      12      10
 0003DC      13                 0003FC      15                 000402      16      11
 00040A      17       16        00044C      19                 000454      20      17
 000494      21
 *OPTIONS IN EFFECT*  NOTERM,NOID,EBCDIC,SOURCE,NOLIST,NODECK,LOAD,MAP,NOTEST
 *OPTIONS IN EFFECT*  NAME = MAIN     ,LINECNT =      55
 *STATISTICS*     SOURCE STATEMENTS =       22,PROGRAM SIZE =      1186
 *STATISTICS*  NO DIAGNOSTICS GENERATED
```

TABLE 11-125

```
F64-LEVEL LINKAGE EDITOR OPTIONS SPECIFIED XREF,LET,LIST
        DEFAULT OPTION(S) USED -  SIZE=(196608,65536)
```

CROSS REFERENCE TABLE

CONTROL SECTION

NAME	ORIGIN	LENGTH
MAIN	00	4A2
IHNFCOMH*	4A8	F8C
IHNCOMH2*	1438	715
IHNFCVTH*	1350	86F
IHNEFNTH*	2CC0	948
IHNEFIOS*	2C08	FF8
IHNFIOS2*	3C00	588
IHNJOPT *	4188	369
IHNFCONI*	4520	2E5
IHNFCONO*	4808	4A2
IHNERRM *	4CB0	5FC
IHNQATBL*	52B0	528
IHNFTEN *	5508	198
IHNETRCH*	5770	2A6

ENTRY

NAME	LOCATION	NAME	LOCATION	NAME	LOCATION	NAME	LOCATION
IBCOM	404	FDIOCS	590	INTSWTCH	140E		
SEQDASD	1866						
ADCON	1850	FCVAOUTP	18FA	FCVLOUTP	1C8A	FCVZOUTP	10E6
FCV1OUTP	218E	FCVEOUTP	2280	FCVCOUTP	23CA	INT6SWCH	2640
ARITH	26CC	ADJSWTCH	2A5C				
FIOCS	2C08	FIOCSBEP	2C0E				
FQCONI	4520						
FQCONO	4808						
ERRMON	4CB0	IHNERRE	4CCB				
FTEN	5508						
IHNTRCH	5770	ERRTRA	5778				

LOCATION	REFERS TO SYMBOL	IN CONTROL SECTION	LOCATION	REFERS TO SYMBOL	IN CONTROL SECTION
60	IBCOM	IHNECOMH	590	SEQDASD	IHNCOMH2
5E8	IHNCOMH2	IHNCOMH2	1314	ADCON	IHNFCVTH
130C	FIOCS	IHNEFIOS	1318	ARITH	IHNEFNTH
1338	ADJSWTCH	IHNEFNTH	1334	IHNJOPT	IHNJOPT
1430	IHNCASE	$UNRESOLVED(W)	131C	FCVEOUTP	IHNFCVTH
1320	FCVEOUTP	IHNFCVTH	1324	FCV1OUTP	IHNFCVTH
1328	FCVCOUTP	IHNFCVTH	132C	FCVAOUTP	IHNFCVTH
1330	FCVZOUTP	IHNFCVTH	12C0	IHNERRE	IHNERRM
12CC	IHNCOMH2	IHNCOMH2	12F0	IHNERRM	IHNERRM
12C4	IHNCOMH2	IHNCOMH2	12C8	IHNCOMH2	IHNCOMH2
12CC	IHNCOMH2	IHNCOMH2	12D0	IHNCOMH2	IHNCOMH2
1690	IHNECOMH	IHNECOMH	1729	IHNECOMH	IHNECOMH
172C	IHNECOMH	IHNECOMH	1480	IHNERRM	IHNERRM
147C	IBCOM	IHNECOMH	19A0	IHNECOMH	IHNECOMH
19B0	IHNECOMH	IHNECOMH	19C0	IHNECOMH	IHNECOMH

TABLE 11-126

LOCATION	REFERS TO SYMBOL	IN CONTROL SECTION
2480	IBCOM	IHNECOMH
2500	FOCOND	IHNFCOND
2AAC	IOCOM	IHNECOMH
2A58	INTOSWCH	IHNFCVTH
2A68	ADCON	IHNFCVTH
2B24	IHNERRM	IHNERRM
2D6C	IHNFIOS2	IHNFIOS2
3A18	IBCOM	IHNECOMH
3A44	IHNFIOS2	IHNFIOS2
479C	FTEN	IHNFTEN
529C	IHNOOPT	IHNOOPT
52A4	IHNTRCH	IHNETRCH
5400	LOFIO	$DUMRESOLVED(WT
58FC	ADCON	IHNFCVTH

LOCATION	REFERS TO SYMBOL	IN CONTROL SECTION
24AC	IHNERRM	IHNERRM
2564	FOCONT	IHNFCONT
2A60	INTSWCH	IHNECOMH
2A64	IHNOOPT	IHNOOPT
2A84	FIOCS	IHNEFIOS
2D68	IHNERRM	IHNERRM
3A0C	IHNOATBL	IHNOATBL
3A20	IHNFIOS2	IHNFIOS2
3BF9	IHNFIOS2	IHNFIOS2
4BF8	FTEN	IHNFTEN
52A0	IBCOM	IHNECOMH
52A8	FIOCSDEP	IHNEFIOS
58F8	IBCOM	IHNECOMH
5904	FIOCSDEP	IHNEFIOS

ENTRY ADDRESS 00

TOTAL LENGTH 5A18

****.MAIN DOES NOT EXIST BUT HAS BEEN ADDED TO DATA SET

AUTHORIZATION CODE IS 0.

TABLE 11-127

ZONE THERMAL LOADS PROGRAM FOR ZIL RUN FOR CLEVELAND OHIO

NZ	NWTC	NGTC	NOW	GAS	NWA	NWIW	NPST	NPV	NDTC	NOPC	MNDT	SLAT	SLON	ACER	GKR	WKY	NWD	WDY	NMO	KCC	KSP	KLS
1	1	1	4	0	0	1	1	3	2	1	0	0.	0.	0.0	0.0	2	1	1	0	0	0	0

ZN NO	ZAREA SQFT	LENGTH FT	WIDTH FT	PEOPLE MBH	PCT LAT	NUM PLU	LIGHTS MBH	WATTS /SQFT	PCT R/A	EQUIP MBH	MISC MBH	PCT LAT	DUPL ZONES	ZONE ID LABEL
1	37800.	0.0	0.0	0.0	0.	378.	0.0	3.75	45.	26.33	0.0	0.	0.0	FLEISHMAN-B 90 * 70

WALL TYPE	WIN U-F	DECK SUM	UNIT WT	C-S MOD	WALL TYPE	WIN U-F	DECK SUM	UNIT WT	C-S MOD	WALL TYPE	WIN U-F	DECK SUM	UNIT WT	C-S MOD	WALL TYPE	WIN U-F	DECK SUM	UNIT WT	C-S MOD
1	0.27	0.0	110.	1.00	0	0.0	0.0	0.	0.0	0	0.0	0.0	0.	0.0	0	0.0	0.0	0.	0.0

GLSS TYPE	WIN U-F	DECK SUM	RAD MOD	GLSS TYPE	WIN U-F	DECK SUM	RAD MOD	GLSS TYPE	WIN U-F	DECK SUM	RAD MOD	GLSS TYPE	WIN U-F	DECK SUM	RAD MOD	GLSS TYPE	WIN U-F	DECK SUM	RAD MOD
1	1.13	0.0	0.81	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0	0.0	0.0	0.0

OUTSIDE WALL DATA - BASIC

ZN	OW	WFA	WTA	WIN	WAREA	W-L	W-H	GIN	PC-WA	G-L	G-H	NO	CFM	GAR	SOF	WRAPCT
1	4	270.	0.	1	0.	90.	50.	1	32.1	0.	0.	0.	0.0	0.	0.	29.0
1	3	180.	0.	1	0.	70.	60.	1	25.7	0.	0.	0.	0.0	0.	0.	27.0
1	2	90.	0.	1	0.	90.	60.	1	38.6	0.	0.	0.	0.0	0.	0.	33.0
1	1	0.	0.	1	0.	70.	60.	1	25.7	0.	0.	0.	0.0	0.	0.	27.0

ROOF AND INTERIOR HEAT TRANSFER WALL DATA

ZN	RAREA	R-L	R-W	U-F	DEC	RH	RSM	PCRA	INTERIOR WALL 1 AREA	W-L	W-H	U-F	NO	PCI	INTERIOR WALL 2 AREA	W-L	W-H	U-F	NO	PCI
1	0.	90.	70.	0.25	0.02	15.0	1.0	99.0	0.0	90.0	10.0	0.27	1	0.	0.0	0.0	0.0	0.0	0	0.

PARTY SPACE TEMPERATURE PROFILES FOR INTERIOR WALLS

NO	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	37.	39.	42.	45.	48.	53.	60.	62.	57.	53.	47.	42.

PERCENTAGE VARIATION PROFILES

1	50./24	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0
2	5./24	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0
3	100./24	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0	0./ 0

PERCENTAGE VARIATION PROFILES BY HOUR

NO	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
1	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.
2	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
3	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.

DAY TYPE DESCRIPTION AND DISTRIBUTION

DT	R-DB	R-DP	PEO	LTS	EQP	MIS	J F M A M J J A S O N D	ZN/ZN	ZN/ZN	ZN/ZN	ZN/ZN	ZN/ZN	ZN/ZN
1	75.	55.	1	3	1	1	* * * * * * * * * * * *	1/ 1	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0
2	75.	0.	0	2	0	2	* *	1/ 1	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0

DESIGN POINT WEATHER DATA

MO	DT	HR	DRYB	DEWP	MO	DT	HR	DRYB	DEWP	ZN/ZN	ZN/ZN	ZN/ZN	ZN/ZN	ZN/ZN	ZN/ZN
1	2	6	2.	-8.	7	1	11	86.	72.	1/ 1	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0

TABLE 11-128

[illegible] THERMAL LOADS [illegible] FOR [illegible] FOR CLEVELAND OHIO

ZONE 1 FLEISHMAN-B 99 * 70

MONTH	PEAK HEATING LOADS SENSIBLE BTU/HR	HOUR TIME	TEMP DB/ DP	LATENT BTU/HR	PEAK COOLING LOADS SENSIBLE BTU/HR	HOUR TIME	TEMP DB/ DP	LATENT BTU/HR
JAN	-615293.	7AM	27/ -8	0.	0.		0/ 0	0.
FEB	-612033.	7AM	27/ -8	0.	0.		0/ 0	0.
MAR	0.		0/ 0	0.	916813.	11AM	91/ 73	60480.
APR	0.		0/ 0	0.	907442.	10AM	91/ 73	60480.
MAY	0.		0/ 0	0.	902772.	10AM	91/ 73	60480.
JUN	0.		0/ 0	0.	900886.	10AM	91/ 73	60480.
JUL	0.		0/ 0	0.	905868.	10AM	91/ 73	60480.
AUG	0.		0/ 0	0.	911573.	10AM	91/ 73	60480.
SEP	0.		0/ 0	0.	920458.	11AM	91/ 73	60480.
OCT	0.		0/ 0	0.	898822.	11AM	91/ 73	60480.
NOV	0.		0/ 0	0.	841361.	12 N	91/ 73	60480.
DEC	0.		0/ 0	0.	811221.	12 N	91/ 73	60480.

TABLE 11-129

ZONE THERMAL LOADS PROGRAM FOR ZIE RUN FOR CLEVELAND OHIO

ZONE 1 FLEISHMAN-B 90 + 70

COMPONENTS OF THE PEAK THERMAL LOADS OF THE YEAR (BTU/HR)

	PEAK HOUR HEATING LOAD		PEAK HOUR COOLING LOAD	
	WINTER DESIGN MO/DY/TIME	OVERALL PEAK MO/DY/TIME	SUMMER DESIGN MO/DY/TIME	OVERALL PEAK MO/DY/TIME
	1/ 2/ 5AM	1/ 2/ 7AM	7/ 1/10AM	9/ 1/11AM
AMBIENT TEMPERATURE				
DRY BULB/DEW POINT	2/ -8	2/ -8	86/ 72	91/ 73
TRANSMISSION AND SOLAR LOADS				
OUTSIDE WALLS	-121308.	-150253.	19776.	33887.
ROOF	-1084.	-1142.	221.	378.
GLASS TRANSMISSION	-469178.	-469178.	70698.	102834.
GLASS SOLAR	0.	0.	387411.	400795.
INTERIOR WALL TRANS	-9234.	-9234.	-3645.	-4374.
INTERNAL LOAD				
SENSIBLE	14514.	14514.	386939.	386939.
LATENT	0.	0.	60480.	60480.
INFILTRATION LOAD				
SENSIBLE	0.	0.	0.	0.
LATENT	0.	0.	0.	0.
TOTAL ZONE LOAD				
SENSIBLE	-586290.	-615293.	861401.	920458.
LATENT	0.	0.	60480.	60480.
DIRECT RETURN AIR LOAD				
INTERNAL HEAT	9676.	9676.	193517.	193517.
ROOF AND WALL HEAT	-157244.	-174839.	30247.	51409.

ZONE THERMAL LOADS PROGRAM FOR ZIE RUN FOR CLEVELAND OHIO

ANNUAL SUMMARY OF PEAK THERMAL LOADS, ALL ZONES (BTU/HR)

	PEAK HOUR HEATING LOAD				PEAK HOUR COOLING LOAD			
ZONE	SENSIBLE HEAT	SENSIBLE + LATENT HEAT	MO/DY/TIME	DB/ DP	SENSIBLE HEAT	SENSIBLE + LATENT HEAT	MO/DY/TIME	DB/ DP
1	-615293.	-615293.	1/ 2/ 7AM	2/ -8	920458.	980938.	9/ 1/11AM	91/ 73

TABLE 11-130

[illegible]

TOTALS FOR ALL ZONES IN THIS RUN (INCLUDING ZONE MULTIPLIERS)

FLOOR AREA, SQ FT	37800.
OUTSIDE WALL AREA (EXCL GLS), SQ FT	12612.
GLASS AREA, SQ FT	5680.
ROOF AREA, SQ FT	6300.

PCT AREAS BY DIRECTION NUMBER	1	2	3	4	5	6	7	8	9
WALLS	24.7	0.0	26.3	0.0	24.[illegible]	0.0	24.2	0.0	0.0
GLASS	19.0	0.0	36.6	0.0	19.0	0.0	25.4	0.0	0.0
GLASS + EQUIV WALLS	19.3	0.0	32.7	0.0	17.8	0.0	30.1	0.0	0.0
GLASS + EQUIV ROOF	19.0	0.0	36.6	0.0	19.0	0.0	25.4	0.0	0.1
GLASS + EQV WALLS & ROOF	19.3	0.0	32.7	0.0	17.8	0.0	30.1	0.0	0.1

	SUM OF INDIVIDUAL ZONE PEAKS HEATING, MBH	SUM OF INDIVIDUAL ZONE PEAKS COOLING, MBH	SUM OF SIMULTANEOUS (DIVERSIFIED) PEAKS HEATING, MBH	SUM OF SIMULTANEOUS (DIVERSIFIED) PEAKS COOLING, MBH	
MO/DAY TYP/TIME			1/ 2/ 7AM	9/ 1/11AM	
DRY BULB/DEW PT			2/ -8	91/ 73	
OUTSIDE WALL TRANSMISSION			-176.3	7.2	16.4
ROOF TRANSMISSION			-1.1	-0.0	0.2
GLASS TRANSMISSION			-469.2	102.8	[illegible]
INTERIOR WALLS			-9.2	-4.4	[illegible]
TOTAL TRANSMISSION			-655.9	105.7	115.0
OUTSIDE WALL SOLAR			26.1	26.6	
ROOF SOLAR			0.0	0.4	
GLASS SOLAR			0.0	400.8	
TOTAL SOLAR			26.1	427.8	
INTERNAL, PEOPLE SENSIBLE			0.0	75.6	
INTERNAL, LIGHTS			14.5	290.3	
INTERNAL, EQUIPMENT			0.0	21.1	
INTERNAL, MISC SENSIBLE			0.0	0.0	
INTERNAL, PEOPLE LATENT			0.0	60.5	
INTERNAL, MISC LATENT			0.0	0.0	
INFILTRATION, SENSIBLE			0.0	0.0	
INFILTRATION, LATENT			0.0	0.0	
RETURN, LIGHTS (NOT IN TOT)			9.7	193.5	
RETURN, TRANSMISSION (NOT IN TOT)			-166.1	2.7	
RETURN, SOLAR (NOT IN TOT)			11.2	48.7	
TOTAL SENSIBLE	-615.3	920.5	-615.3	920.5	
TOTAL LATENT	0.0	60.5	0.0	60.5	

PEAK INTERNAL PEOPLE (SENS + LAT), MBH	170.10		
PEAK INTERNAL LIGHTS (TOTAL), MBH	483.79	HIGHEST AMB DRY-BULB TEMP, F	91.
PEAK INTERNAL EQUIPMENT, MBH	26.33	HIGHEST WALL TRANS GAIN, MBH	16.4
PEAK INTERNAL MISC (SENS + LAT), MBH	0.0	HIGHEST ROOF TRANS GAIN, MBH	0.2
		LOWEST AMB DRY-BULB TEMP, F	2.
PEAK INFILTRATION, CFM	0.0	HIGHEST WALL TRANS LOSS, MBH	-176.3

TABLE 11-131

REVIEW OF DESIGN HEATING REQUIREMENT FOR CLEVELAND DEPTH BUILDING DPR RUN

NDISTS 1 TOTAL NO OF ZONES ON TAPE 1 NO OF MONTHS TO RUN 0 NO OF DAYS/MO 0

DS NO	ZN /DS	STD KEY	H-K COOL	H-K HEAT	LABEL
1	1	0	62.	0.	3 AIR DISTRIBUTION SYSTEMS MODELED AS ONE

DS NO	ZN NO	FLOOR AREA	CEIL HT	MAX PEO	S-AIR DEL T	MIN S-AIR	OUTSIDE AIR REQUIREMENTS CFM/SF	CFM/PER	PC-AIRF	CHNGS/HR	NO IDTL ZONES	ZONE ID LABEL
1	1	37800.	8.0	378.	19.0	0.01	0.0	10.00	0.0	0.0	0.0	FLEISHMAN-B 90 * 70

TABLE 11-132

SUMMARY OF DESIGN POWER REQUIREMENT FOR [illegible] OFFICE BUILDING, DPR RUN

D. S. NO 1 3 AIR DISTRIBUTION SYSTEMS MODELED AS ONE

ANNUAL SUMMARY

ZN	**** PEAK HEATING LOADS **** SENS MBH	MO/DY/TIME	SENS + LAT MBH	MO/DY/TIME	TOT HRS	******** PEAK COOLING LOADS ******* SENS TONS	MO/DY/TIME	SENS + LAT TONS	MO/DY/TIME	SH RATIO	TOT HRS	** DESIGN AIRFLOWS ** TOTAL SUPPLY AIR CFM	SPLY AIR CFM/ SQFT	MAXIMUM OUTSIDE AIR CFM
1	615.	1/ 1/ 7AM	615.	1/ 1/ 7AM	48	76.7	9/ 1/11AM	81.7	9/ 1/11AM	0.94	240	44857.	1.19	3780.
ALL	615.	1/ 1/ 7AM	615.	1/ 1/ 7AM	48	76.7	9/ 1/11AM	81.7	9/ 1/11AM	0.94	240	44857.	1.19	3780.
	615.*		615.*			76.7*		81.7*						

* SUM OF INDIVIDUAL ZONE PEAKS

	HEATING MBH	MO/DY/TIME	DBT/DPT	COOLING TONS	MO/DY/TIME	DBT/DPT
INDEPENDENT LOADS						
ESTIMATED PEAK OUTSIDE AIR LOAD, SENSIBLE	298.	1/ 1/12 M	2/ -8	5.4	3/ 1/ 1AM	91/ 73
LATENT	0.			13.2		
RETURN AIR LOAD AT O/A PEAK	141.			17.6		
ZONE LOAD (SENSIBLE + LATENT)	615.	1/ 1/ 7AM	2/ -8	81.7	9/ 1/11AM	91/ 73
TOTAL	1055.			118.0		
SIMULTANEOUS LOADS AT PEAK ZONE LOADS						
OUTSIDE AIR LOAD, SENSIBLE	298.	1/ 1/ 7AM	2/ -8	5.4	9/ 1/11AM	91/ 73
LATENT	0.			13.2		
RETURN AIR LOAD	151.			18.7		
ZONE LOAD (SENSIBLE + LATENT)	615.			81.7		
TOTAL	1065.			119.1		
			DBT/WBT			DBT/WBT
ENTERING CONDITIONS			65.7/ 58.1			81.0/ 65.0
LEAVING CONDITIONS			87.7/ 65.8			56.0/ 54.3

MAXIMUM SIMULTANEOUS AIRFLOW FOR ALL ZONES AT 19.0F DT (THERMAL LOADS ONLY), CFM 44857.

SUM OF MINIMUM SUPPLY AIRFLOWS, CFM 378.

SUM OF ZONE AREAS IN THIS DIST SYS 37800. SQ FT

TABLE 11-133

REVIEW OF DESIGN POINT REQUIREMENT FOR CLEVELAND OFFICE BUILDING DPR RUN

U. S. NUS. 1

SUM OF ALL DISTRIBUTION SYSTEMS IN THIS RUN (DIVERSITY BETWEEN SYSTEMS NOT CONSIDERED)

TOTAL FLOOR AREA, SQ FT	37800.
TOTAL SUPPLY AIRFLOW, CFM	44857.
TOTAL OUTSIDE AIRFLOW, CFM	3780.
TOTAL ZONE HEATING (SENS + LAT), MBH	615.
TOTAL O/A SENSIBLE HEAT, MBH	298.
TOTAL O/A LATENT HEAT, MBH	0.
TOTAL RETURN AIR HEAT, MBH	151.
SUM OF ALL DISTRIB SYS HEATING, MBH	1065.
TOTAL ZONE COOLING (SENS + LAT), TONS	81.7
TOTAL O/A SENSIBLE COOL, TONS	5.4
TOTAL O/A LATENT COOL, TONS	13.2
TOTAL RETURN AIR COOL, TONS	18.7
SUM OF ALL DISTRIB SYS COOLING, TONS	119.1

TABLE 11-134

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISHMAN-B 120 TONS 90 * 70 CLEVELAND COMPOSITE WEATHER TAPE VAV NO ECON 04/18/79

SYS TP	FLOOR	SOLAR	PIP	PCIPL	PILT	PCILTR	PCLTRH	PIE	PIM	PCIML	PPI	PPD	PBEA	PBEB	PBEC	KY
8	37800.	427.8	136.1	44.	483.8	40.	0.	21.1	0.0	0.	39.5	6.4	6.	142.	40.	1

SOLAR AREA PERCENTAGES

D1	D2	D3	D4	D5	D6	D7	D8	H	SH	MO	HR
19.	0.	33.	0.	18.	0.	30.	0.	0.	0.	9	1[illegible]

TIME

HSCAP	CSCAP
1126.	120.

SHUTOFF AND PRIMARY FUEL INTERRUPTION TEMPERATURES -- NO. OF DAYS

INTHST	INTCST	PFIT	HRS	JA	FE	MA	AP	MA	JU	JU	AU	SE	OC	NO	DE
		0		0	0	0	0	0	0	0	0	0	0	0	0

HEATING LOADS

HIDB	HIDP	HODB	HODP	HDTL	TLHDU	HDSTU	TLHDL	HDSTL
72.	0.	2.	-8.	628.9	0.	0.	0.	0.

COOLING LOADS

CIDB	CIDP	CODB	CODP	CDTG	CDST	HRCD	SCDST	SHRCD
-75.	55.	91.	73.	115.0	56.	62.	0.	0.

RATRLM	RASOLM	SFDT	RFDT	HSF	KHSF
26.8	44.9	0.4	0.0	0.	0

AIRFLOW DATA

TSA	ZVFCM	ZVFHM	OAVMAX	OAMINC	OAMINH	OAMINS	TLEU	TLEL	TLCDU	CDTU	TLCDL	CDTL	CDTUO	VVMAF	EFFS	EFFL
50000.	0.	0.	3780.	3780.	3780.	3402.	0.	0.	0.	0.	0.	0.	0.	10.	0.	0.

ADDITIONAL SYSTEM DATA

REC HEAT RATO	NORMAL OPERATION..... MX TM	MN SUPL HT	MX TM	MN SUPL HT	SETBACK OPERATION..... MX TM	MN SUPL HT	MN TM	SUPL HT	EL KY	SY KY	PCT REDUCTION IN PEAK PROCESS..... J	F	M	A	M	J	J	A	S	O	N	D	PR KY	HUMID RS HI DP	HI AM	LO AM	HM KY	AR KY	INFIL CFM	IN KY
0.0	65	53.	-10	727.	65	53.	-10	727.	0	0	0.	0.	5.	10.	12.	15.	20.	20.	15.	10.	7.	5.	0	0	0	0	0	3	3402.	1

SHUTOFF AND SETBACK TIME SCHEDULES

NO	HR,DR	HR,DR	MO/MO	HR,DR	HR,DR	MO/MO	HR,DR	HR,DR	MO/MO	HR,DR	HR,DR	MO/MO	HR,DR	HR,DR	MO/MO	HR,DR	HR,DR	MO/MO	HR,DR	HR,DR	MO/MO
1	1, 5	20, 5	1/12	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0
2	1, 7	16, 9	1/12	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0
3	1,24	0, 0	1/12	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0
4	1, 7	20, 5	1/ 3	1, 5	20, 5	4/ 9	1, 7	20, 5	10/12	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0
5	1, 8	16, 9	1/ 3	1, 7	16, 9	4/ 9	1, 8	16, 9	10/12	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0
6	1,24	0, 0	6/ 9	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0
7	1,24	0, 0	1/ 3	1,24	0, 0	11/12	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0

SETBACK TEMPERATURE SCHEDULE

NO	TEMP	MO/MO	TEMP	MO/MO	TEMP	MO/MO	TEMP	MO/MO	TEMP	MO/MO	TEMP	MO/MO
1	70	1/12	0	0/ 0	0	0/ 0	0	0/ 0	0	0/ 0	0	0/ 0

PERCENTAGE VARIATION PROFILES

1	0., 6	1., 1	5., 1	90., 1	95., 1	100., 2	75., 1	90., 1	100., 2	95., 1	60., 1	40., 1	PEOPLE WEEKDAYS
1	10., 1	5., 4	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	
2	0., 6	1., 2	5., 1	20., 3	15., 1	20., 1	15., 1	10., 1	5., 8	0., 0	0., 0	0., 0	PEOPLE SATURDAY
3	5., 6	40., 1	80., 1	100.,14	75., 3	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	LIGHTS WEEKDAYS
4	5., 8	20., 1	60., 2	40., 1	30., 1	20., 1	15., 1	10., 1	5., 8	0., 0	0., 0	0., 0	LIGHTS SATURDAY
5	5.,24	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	LIGHTS HOLIDAYS
6	0., 9	53., 3	100., 2	53., 5	20., 2	0., 3	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	
7	0., 9	10., 3	20., 2	10., 1	0., 9	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	
21	100., 1	100.,99	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	

DAY NUMBER FOR JANUARY 1 IS 3 LEAP YEAR KEY IS 0

HOL														
	1/ 1, 0	3/ 4, 0	5/30, 0	7/ 4, 0	9/ 1, 0	10/13, 0	11/27, 0	12/25, 0	0/ 0, 0	0/ 0, 0	0/ 0, 0	0/ 0, 0

TABLE 11-135

DAY TYPE DESCRIPTION AND DISTRIBUTION

DT NO	PCT PLD	VARIATION PROFILE NUMBERS..... EOP	MSC	IPK	DPK	BEA	BEB	BEC	VOA	KEY DA	TIME SCHEDULES DA	HS	CS	SB	OP	SBT SCH	TST SCH	J F M A M J J A S O N D	S M T W T F S	H
1	1	3	1	0	6	1	1	3	0	0	0	4	6	4	1	0	1	0	* * * * * * * * * * * *	* * * * *	
2	2	4	2	0	7	2	2	4	0	0	0	5	6	5	2	0	1	0	* * * * * * * * * * * *		*
3	0	5	0	0	0	0	0	5	0	0	0	3	6	3	3	0	1	0	* * * * * * * * * * * *	*	*

SPECIAL HOURLY PRINTOUT

MO	DAY/DAY		MO	DAY/DAY		MO	DAY/DAY		MO	DAY/DAY		PRINT KEY
0	0	0	0	0	0	0	0	0	0	0	0	0

PERCENTAGE VARIATION PROFILES

NUMBER	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
1	0.	0.	0.	0.	0.	0.	1.	5.	90.	95.	100.	100.	75.	90.	100.	100.	95.	60.	40.	10.	5.	5.	5.	5.
2	0.	0.	0.	0.	0.	0.	1.	1.	5.	20.	20.	20.	15.	20.	15.	10.	5.	5.	5.	5.	5.	5.	5.	5.
3	5.	5.	5.	5.	5.	5.	40.	80.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	75.	75.	75.
4	5.	5.	5.	5.	5.	5.	5.	5.	20.	60.	60.	40.	30.	20.	15.	10.	5.	5.	5.	5.	5.	5.	5.	5.
5	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
6	0.	0.	0.	0.	0.	0.	0.	0.	0.	53.	53.	53.	100.	100.	53.	53.	53.	53.	53.	20.	20.	0.	0.	0.
7	0.	0.	0.	0.	0.	0.	0.	0.	0.	10.	10.	10.	20.	20.	10.	0.	0.	0.	0.	0.	0.	0.	0.	0.

SHUTOFF AND SETBACK TIME SCHEDULE 1

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
FEB	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
MAR	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
APR	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
MAY	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
JUN	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
JUL	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
AUG	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
SEP	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
OCT	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
NOV	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
DEC	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1

SHUTOFF AND SETBACK TIME SCHEDULE 2

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
FEB	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
MAR	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
APR	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
MAY	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
JUN	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
JUL	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
AUG	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
SEP	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
OCT	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
NOV	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
DEC	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1

TABLE 11-136

SHUTOFF AND SETBACK TIME SCHEDULE 3

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
FEB	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MAR	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
APR	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MAY	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
JUN	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
JUL	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
AUG	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SEP	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
OCT	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
NOV	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DEC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

SHUTOFF AND SETBACK TIME SCHEDULE 4

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
FEB	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
MAR	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
APR	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
MAY	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
JUN	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
JUL	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
AUG	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
SEP	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
OCT	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
NOV	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
DEC	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1

SHUTOFF AND SETBACK TIME SCHEDULE 5

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
FEB	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
MAR	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
APR	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
MAY	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
JUN	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
JUL	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
AUG	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
SEP	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
OCT	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
NOV	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
DEC	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1

TABLE 11-137

SHUTOFF AND SETBACK TIME SCHEDULE 6

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FEB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
APR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JUN	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
JUL	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
AUG	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SEP	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
OCT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NOV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

SHUTOFF AND SETBACK TIME SCHEDULE 7

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
FEB	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MAR	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
APR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JUN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JUL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AUG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SEP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OCT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NOV	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DEC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

SETBACK TEMPERATURE SCHEDULE 1

70	70	70	70	70	70	70	70	70	70	70	70

TABLE 11-138

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISHMAN-H 125 TONS 95 * 70 CLEVELAND COMPOSITE WEATHER TAPE VAV NO ECON 04/18/79

SYSTEM TYPE B STD. VARIABLE VOLUME

UNIT VALUES OF INPUT DATA (FLOOR AREA = 37800. SQFT)

	LATENT	SENSIBLE	
SOLAR LOAD		11.32	BTUH/SQFT
TRANSMISSION LOSS		0.238	BTUH/F-SQFT
TRANSMISSION GAIN		0.190	BTUH/F-SQFT
TOTAL INTERNAL LOAD	1.58	15.37	BTUH/SQFT
PEOPLE	1.58	2.02	BTUH/SQFT
LIGHTS		12.80	BTUH/SQFT
EQUIPMENT		0.56	BTUH/SQFT
MISCELLANEOUS	0.0	0.0	BTUH/SQFT
MINIMUM O/A, COOLING	4.20	1.73	BTUH/SQFT
OR ...		0.100	CFM/SQFT
OR ...		7.56	PCT OF TOTAL
PEAK COOLING LOAD	5.66	33.37	BTUH/SQFT
ROOM SENS ONLY		24.61	BTUH/SQFT
TOTAL		3.25	TONS/1000 SQFT
OR ...		307.44	SQFT/TON
COOLING CAPACITY		3.17	TONS/1000 SQFT
OR ...		315.00	SQFT/TON
ROOM SENS ONLY		27.14	BTUH/SQFT
MINIMUM O/A, HEATING	0.0	7.56	BTUH/SQFT
OR ...		0.100	CFM/SQFT
OR ...		7.56	PCT OF TOTAL
PEAK HEATING LOAD	0.0	24.20	BTUH/SQFT
HEATING CAPACITY		29.79	BTUH/SQFT
TOTAL PROCESS LOAD		1.22	BTUH/SQFT
INDIRECT		1.05	BTUH/SQFT
DIRECT		0.17	BTUH/SQFT
TOTAL BASE ELEC LOAD		4.96	WATTS/SQFT
SOURCE A		0.16	WATTS/SQFT
SOURCE B		3.75	WATTS/SQFT
SOURCE C		1.05	WATTS/SQFT
TOT PRIMARY AIRFLOW		1.323	CFM/SQFT
OR ...		416.7	CFM/TON

HEATING INSIDE = 72. / C. OUTSIDE = 2. / -8.

COOLING INSIDE = 75. /55. OUTSIDE = 91. /73.

TABLE 11-139

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISHMAN-B 120 TONS 90 * 70 CLEVELAND COMPOSITE WEATHER TAPE VAV NO ECON 04/18/79

MONTHLY AND ANNUAL PEAK LOAD VALUES

	PEAK HEATING, MBH		PEAK COOLING, TONS		HUMIDFCN	INDIRECT PROCESS	DIRECT PROCESS	TOT BASE ELECTRIC
	RM LOSS	COILS	RM GAIN	COILS	MBH	MBH	MBH	KW
** JAN **	899.	1716.	41.6	93.0	0.	43.	6.	167.
DAY OF MONTH	29	28	2	2	0	2	2	2
TIME OF DAY	4AM	5AM	3PM	12 N		12 N	10AM	12 N
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	1	3	47	46	0	46	40	46
DEW POINT TEMP	-4	-4	38	37	0	37	33	37
** FEB **	893.	1662.	40.7	84.7	0.	40.	6.	170.
DAY OF MONTH	12	4	25	13	0	1	1	13
TIME OF DAY	3AM	5AM	4PM	11AM		12 N	10AM	11AM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	2	6	42	14	0	32	30	14
DEW POINT TEMP	-5	-1	27	2	0	26	26	2
** MAR **	786.	1235.	56.7	81.0	0.	38.	6.	169.
DAY OF MONTH	8	18	12	12	0	1	1	8
TIME OF DAY	1AM	5AM	11AM	4PM		12 N	10AM	10AM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	12	30	60	61	0	39	39	24
DEW POINT TEMP	5	26	43	40	0	34	33	15
** APR **	564.	1045.	64.0	120.0	0.	36.	6.	187.
DAY OF MONTH	4	8	29	22	0	1	1	22
TIME OF DAY	12 M	5AM	4PM	8AM		12 N	10AM	8AM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	31	34	75	68	0	59	59	68
DEW POINT TEMP	28	32	45	53	0	55	55	53
** MAY **	553.	340.	64.6	118.8	0.	35.	6.	174.
DAY OF MONTH	3	3	27	6	0	1	1	6
TIME OF DAY	4AM	4AM	10AM	7AM		12 N	10AM	8AM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	33	33	72	65	0	71	64	66
DEW POINT TEMP	29	29	44	44	0	33	32	44
** JUN **	355.	0.	70.1	120.0	0.	34.	6.	188.
DAY OF MONTH	2	0	26	10	0	3	3	17
TIME OF DAY	2AM		10AM	7AM		12 N	10AM	10AM
DAY TYPE	3	0	1	1	0	1	1	1
DRY BULB TEMP	47	0	91	88	0	75	75	85
DEW POINT TEMP	43	0	69	53	0	56	53	67

TABLE 11-140

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISHMAN-B 120 TONS 95 * 70 CLEVELAND COMPOSITE WEATHER TAPE VAV NO ECON 04/19/79

MONTHLY AND ANNUAL PEAK LOAD VALUES

	PEAK HEATING, MBH		PEAK COOLING, TONS		HUMIDFCN	INDIRECT PROCESS	DIRECT PROCESS	TOT BASE ELECTRIC
	RM LOSS	COILS	RM GAIN	COILS	MBH	MBH	MBH	KW
** JUL **	283.	0.	72.1	120.0	0.	32.	6.	188.
DAY OF MONTH	10	0	12	1	0	1	1	8
TIME OF DAY	4AM		5PM	5AM		12 N	10AM	10AM
DAY TYPE	1	0	1	1	0	1	1	1
DRY BULB TEMP	52	0	94	65	0	77	73	84
DEW POINT TEMP	52	0	62	57	0	57	55	67
** AUG **	368.	0.	72.9	120.0	0.	32.	6.	177.
DAY OF MONTH	24	0	27	5	0	1	1	5
TIME OF DAY	3AM		4PM	5AM		12 N	10AM	8AM
DAY TYPE	2	0	1	1	0	1	1	1
DRY BULB TEMP	45	0	90	64	0	77	73	72
DEW POINT TEMP	43	0	63	64	0	45	41	60
** SEP **	417.	0.	78.2	120.0	0.	34.	6.	181.
DAY OF MONTH	27	0	13	2	0	2	2	13
TIME OF DAY	2AM		4PM	5AM		12 N	10AM	4PM
DAY TYPE	1	0	1	1	0	1	1	1
DRY BULB TEMP	41	0	95	65	0	64	71	95
DEW POINT TEMP	40	0	62	64	0	63	63	62
** OCT **	504.	406.	65.3	100.2	0.	36.	6.	169.
DAY OF MONTH	25	25	4	4	0	1	1	4
TIME OF DAY	4AM	7AM	3PM	3PM		12 N	10AM	3PM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	34	33	82	82	0	65	63	82
DEW POINT TEMP	29	27	60	60	0	45	45	60
** NOV **	835.	1376.	50.6	92.1	0.	37.	6.	164.
DAY OF MONTH	29	28	1	11	0	1	1	11
TIME OF DAY	12 M	5AM	2PM	1PM		12 N	10AM	1PM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	8	16	65	49	0	62	54	49
DEW POINT TEMP	0	9	40	37	0	36	33	37
** DEC **	774.	1575.	40.9	78.2	0.	38.	6.	163.
DAY OF MONTH	21	16	4	17	0	2	2	17
TIME OF DAY	12 M	5AM	3PM	11AM		12 N	10AM	11AM
DAY TYPE	2	1	1	1	0	1	1	1
DRY BULB TEMP	13	11	50	27	0	37	36	27
DEW POINT TEMP	6	5	31	15	0	34	34	15
** ANN **	899.	1716.	78.2	120.0	0.	43.	6.	188.
MONTH OF YEAR	1	1	9	6	0	1	1	6
DAY OF MONTH	29	28	13	10	0	2	2	17
TIME OF DAY	4AM	5AM	4PM	7AM		12 N	10AM	10AM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	1	3	95	66	0	46	40	85
DEW POINT TEMP	-4	-4	62	53	0	37	33	67

TABLE 11-141

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISHMAN-B 120 TONS 93 * 70 CLEVELAND COMPOSITE WEATHER TAPE VAV NO ECON 04/18/79

MONTHLY AND ANNUAL LOADS

	HEATING MBTU	HEAT HOURS	COOLING TON-HRS	COOL HOURS	HUMIDFCN MBTU	IND PROC MBTU	DIR PROC MBTU	BS ELEC A KWH	BS ELEC B KWH	BS ELEC C KWH	TOT BS EL KWH	AUX F HRS
JAN	341741.	744	6787.	173	0.	5902.	1430.	1373.	55003.	1235.	57611.	0
FEB	269278.	672	7392.	182	0.	5377.	1304.	1252.	50083.	1259.	52594.	0
MAR	230019.	740	10301.	222	0.	5138.	1315.	1262.	50898.	2229.	54390.	0
APR	139655.	619	15643.	302	0.	5512.	1430.	1373.	54833.	2723.	58929.	0
MAY	87091.	583	13491.	335	0.	5194.	1430.	1373.	55003.	2987.	59363.	0
JUN	0.	0	25218.	319	0.	4597.	1315.	1262.	50728.	4899.	56889.	0
JUL	0.	0	33612.	340	0.	4721.	1430.	1373.	55003.	6471.	62847.	0
AUG	0.	0	25110.	346	0.	4747.	1441.	1383.	55308.	4443.	61134.	0
SEP	0.	0	19159.	309	0.	4793.	1367.	1312.	52628.	3623.	57563.	0
OCT	107930.	612	15227.	298	0.	5548.	1493.	1434.	57208.	3768.	62409.	0
NOV	230369.	706	7895.	203	0.	5030.	1315.	1262.	50728.	1502.	53492.	0
DEC	334567.	744	6229.	169	0.	5357.	1367.	1312.	52798.	1119.	55230.	0
ANN	1740649.	5420	189070.	3233	0.	61715.	16639.	15972.	640221.	36256.	692453.	0

TABLE 11-142

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISHMAN-B 120 TONS 90 + 70 CLEVELAND COMPOSITE WEATHER TAPE VAV NO ECON 04/18/79

	SD OR SA	MO/DY/TIME	NORM OPER	MO/DY/TIME
MIN ROOM TEMP	69.81 F	12/22/ 2AM	71.86 F	9/23/ 6AM
MAX ROOM TEMP	88.08 F	7/21/ 7PM	75.22 F	6/26/10AM
MAX ROOM HUMIDITY RATIO	87.22 GR	7/ 8/ 3PM		

COUNT OF HOURS ON LIMITING CONDITIONS	HEATING	COOLING
SPACE LOAD NOT MET (INCL PICKUP LOAD)	1	96
SPACE LOAD NOT MET (W/O PICKUP LOAD)	1	17
SYSTEM CAPACITY EXCEEDED	0	123
LONGEST PICKUP PERIOD	1	20
LAST HOUR OF OCCURRENCE	9/23/ 6AM	7/23/10AM

UNIT VALUES OF BUILDING ENERGY PEAKS AND CONSUMPTION

HEATING PEAK	45.40	BTUH/SQFT
HEATING CONSUMPTION	46.05	MBTU/SQFT
FULL LOAD HEATING	1014.	HRS
COOLING PEAK	3.17	TONS/1000 SQFT
OR	315.00	SQFT/TON
COOLING CONSUMPTION	5.00	TON-HRS/SQFT
FULL LOAD COOLING	1576.	HRS
PROCESS PEAK	1.22	BTUH/SQFT
PROCESS CONSUMPTION	2.07	MBTU/SQFT
INDIRECT	1.63	MBTU/SQFT
DIRECT	0.44	MBTU/SQFT
FULL LOAD PROCESS	1735.	HRS
ELECTRIC PEAK	4.96	WATTS/SQFT
ELECTRIC CONSUMPTION	18.32	KWH/SQFT
FULL LOAD ELECTRIC	3692.	HRS

ANNUAL EQUIVALENT ENERGY CONSUMPTION = 170666. BTU/SQFT/YR

PEAK HEATING LOAD DURING SETBACK = 330. MBH

MAX SUPPLY AIRFLOW IS 50000. CFM 3/ 1/ 5AM MIN SUPPLY AIRFLOW IS 5000. CFM 1/ 1/ 9AM

TABLE 11-143

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISHMAN-B 120 TONS 90 * 70 CLEVELAND COMPOSITE WEATHER TAPE VAV NO ECON 04/18/79

YRTR MO DT DB TIME DY CC DP	SOLRAD KBTS	TRLOAD KBTU	BHSHRC BHSHRT	ZSHG TZSHG	DALTM DELHR	RTEMP RAT	AMAT HRRA	COST HDST	TSA/ZVFC ZVFH	CCLOAD HCLOAD	CLT HLT	D-PROC I-PROC	HUMID BELEC
*** JAN ***													
694 1 1 3	0.	-601056.	-761292.	-832328.	3402.	72.0	24.2	56.0	5000.	0.	0	0.	0.
5AM 28 10 -4	14514.	114.	0.	-847684.	0.0	68.0	4.5	229.0	0.	1715963.	0	0.	7.
37 1 1 46	347036.	-258957.	0.	451316.	3780.	74.8	75.3	56.0	40127.	1116545.	0	4821.	0.
12 N 2 1 37	363237.	44913.	0.	823845.	10.15	77.9	38.6	56.0	0.	223607.	0	39536.	167.
*** FEB ***													
822 2 1 0	0.	-574069.	-761292.	-794305.	3402.	72.0	26.2	56.0	5000.	0.	0	0.	0.
5AM 4 3 -1	14514.	-1731.	0.	-832087.	0.0	68.1	5.4	226.1	0.	1662244.	0	0.	7.
1044 2 1 14	386761.	-546790.	0.	227527.	3780.	74.9	71.5	56.0	40904.	1016956.	0	6429.	0.
11AM 13 2 2	387556.	59884.	0.	839794.	11.73	76.9	13.4	56.0	0.	511123.	0	20954.	170.
*** MAR ***													
1830 3 1 30	0.	-360388.	-761292.	-493245.	3402.	72.0	42.9	56.0	5000.	0.	0	0.	0.
5AM 19 10 26	14514.	1146.	0.	-710813.	0.0	69.0	20.1	203.6	0.	1235494.	0	0.	7.
1697 3 1 61	401453.	-125735.	0.	658410.	3780.	75.0	78.6	56.0	39740.	972392.	0	6107.	0.
4PM 12 1 40	382692.	56890.	0.	815893.	0.07	80.0	48.9	56.0	0.	88834.	0	19906.	168.
*** APR ***													
2334 4 1 34	0.	-324032.	-761292.	-309518.	3780.	72.0	42.9	56.0	5000.	0.	0	0.	0.
5AM 8 6 32	14514.	0.	0.	-556925.	0.0	69.1	26.6	175.1	0.	1045171.	0	0.	7.
2673 4 1 69	168417.	-75832.	812696.	490413.	3780.	75.5	83.4	56.7	50000.	1439998.	1	5786.	0.
8AM 22 6 53	377828.	53896.	86756.	1072952.	0.0	84.3	53.6	56.7	0.	0.	0	0.	187.
*** MAY ***													
2933 5 1 33	0.	-388547.	0.	-532920.	0.	75.9	0.0	0.0	0.	0.	0	0.	0.
4AM 3 0 29	14514.	-44496.	345878.	-255568.	0.0	75.1	42.0	0.0	0.	340410.	0	0.	7.
3009 5 1 65	145285.	-105183.	977946.	277189.	3780.	75.0	82.5	56.0	49856.	1425445.	0	321.	0.
7AM 6 7 44	237088.	2994.	0.	1023576.	0.0	83.5	39.8	56.0	0.	52894.	0	0.	153.
*** JUN ***													
0 0 0 0	0.	0.	0.	0.	0.	0.0	0.0	0.0	0.	0.	0	0.	0.
0 0 0	0.	0.	0.	0.	0.0	0.0	0.0	0.0	0.	0.	0	0.	0.
3844 6 1 66	204654.	-97376.	1095760.	343865.	3780.	75.1	82.7	56.0	50000.	1440000.	1	321.	0.
7AM 10 1 53	237088.	2994.	89614.	1115741.	0.00	83.6	60.9	56.0	0.	0.	0	0.	153.

TABLE 11-144

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISHMAN-8 120 TONS 90 * 70 CLEVELAND COMPOSITE WEATHER TAPE VAV NO ECON 04/18/79

YRHR MO DT DB TIME DY CC DP	SOLRAD KBTS	TRELOAD KBTL	BHSHRC BHSHRT	ZSHG TZSHG	DACEM DLENR	KTEMP RAT	AMAT HRKA	COST HDST	TSA/ZVFC ZVFH	CCLOAD HCLOAD	CLT HLT	D-PROC I-PROC	HUMID BELEC
*** JUL ***													
0 0 0 0	0.	0.	0.	0.	0.	0.0	0.0	0.0	0.	0.	0	0.	0.
0 0 0	0.	0.	0.	0.	0.0	0.0	0.0	0.0	0.	0.	0	0.	0.
4350 7 1 65	0.	-147404.	2438298.	-132890.	3780.	79.5	83.1	56.4	50000.	1440000.	1	0.	0.
5AM 1 0 57	14514.	0.	558586.	1562619.	1.21	84.2	63.2	56.4	0.	0.	0	0.	47.
*** AUG ***													
0 0 0 0	0.	0.	0.	0.	0.	0.0	0.0	0.0	0.	0.	0	0.	0.
0 0 0	0.	0.	0.	0.	0.0	0.0	0.0	0.0	0.	0.	0	0.	0.
5190 8 1 64	0.	-146805.	2032270.	-132291.	3780.	78.5	84.0	57.3	50000.	1440000.	1	0.	0.
5AM 5 10 64	14514.	0.	325461.	1281744.	2.54	85.2	64.4	57.3	0.	0.	0	0.	47.
*** SEP ***													
0 0 0 0	0.	0.	0.	0.	0.	0.0	0.0	0.0	0.	0.	0	0.	0.
0 0 0	0.	0.	0.	0.	0.0	0.0	0.0	0.0	0.	0.	0	0.	0.
5862 9 1 65	0.	-152303.	2645831.	-137789.	3780.	80.1	84.5	57.9	50000.	1440000.	1	0.	0.
5AM 2 10 64	14514.	0.	772726.	1699322.	3.22	85.7	65.1	57.9	0.	0.	0	0.	47.
*** OCT ***													
7136 10 1 33	0.	-368847.	0.	-131760.	3780.	74.3	43.8	56.0	5000.	0.	0	321.	0.
7AM 25 7 27	237088.	2994.	0.	281777.	0.0	75.6	22.8	56.0	0.	406486.	0	0.	114.
6640 10 1 82	350508.	45696.	0.	783760.	3780.	75.0	81.2	56.0	40698.	1202939.	0	6429.	0.
3PM 4 4 63	387556.	59884.	0.	835552.	3.38	80.7	64.1	56.0	0.	0.	0	18859.	169.
*** NOV ***													
7950 11 1 16	0.	-488027.	-640958.	-673079.	3402.	72.0	33.3	56.0	5000.	0.	0	0.	0.
5AM 28 10 9	14514.	-66843.	0.	-673724.	0.0	68.8	14.1	196.8	0.	1376038.	0	0.	7.
7550 11 1 49	272805.	-233160.	0.	417473.	3780.	75.0	75.6	56.0	37534.	1104637.	0	5786.	0.
1PM 11 6 37	377828.	53896.	0.	770611.	11.92	78.2	40.0	56.0	0.	196652.	0	36768.	164.
*** DEC ***													
8382 12 1 11	0.	-530841.	-761192.	-733401.	3402.	72.0	29.7	56.0	5000.	0.	0	0.	0.
5AM 16 10 5	14514.	196.	0.	-808355.	0.0	68.4	7.1	221.8	0.	1575163.	0	0.	7.
8412 12 1 27	236098.	-429624.	0.	244030.	3780.	74.8	72.2	56.0	36334.	938216.	0	6429.	0.
11AM 17 0 15	347556.	59884.	0.	745973.	12.02	77.0	19.7	56.0	0.	394319.	0	19906.	163.

TABLE 11-145

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLETSMAN-B 120 TONS 90 * 70 CLEVELAND COMPOSITE WEATHER TAPE VAV ECON 04/18/79

SYS TP	TLOAD	SOLAR	PIP	PCIPL	PILT	PCILTR	PCLTRH	PIE	PIM	PCIML	PPI	PPO	PBEA	PBEB	PBEC	KY
8	17800.	427.8	136.1	44.	483.8	40.	0.	21.1	0.0	0.	39.5	6.4	6.	142.	43.	1

SOLAR AREA PERCENTAGES

D1	D2	D3	D4	D5	D6	D7	D8
19.	0.	33.	0.	18.	0.	30.	0.

TIME

H	SH	MO	HR	HSCAP	CSCAP
0.	0.	9	12	1126.	120.

SHUTOFF AND PRIMARY FUEL INTERRUPTION TEMPERATURES -- NO. OF DAYS

INTHST	INTCST	PFIT	HRS	JA	FE	MA	AP	MA	JU	JU	AU	SE	OC	NO	DE
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

HEATING LOADS

HIDB	HIDP	HODB	HODP	HOTL	TLHDO	HDSTO	TLHDL	HDSTL
72.	0.	2.	-8.	628.9	0.	0.	0.	0.

COOLING LOADS

CIDB	CIDP	CODB	CODP	CDTG	CDST	HRCD	SCDST	SHRCD
-75.	55.	91.	73.	115.0	56.	62.	0.	0.

RATRLM	RASOLM	SFDT	RFDT	HSF	KHSF
26.8	44.9	0.4	0.0	0.	0

AIRFLOW DATA

TSA	ZVFCM	ZVFHM	DAVMAX	DAMINC	DAMINH	DAMINS	TLEU	TLEL	TLCDU	CDTU	TLCDL	CDTL	CDTUO	VVMAF	EFFS	EFFL
50000.	0.	0.	50000.	3780.	3780.	3402.	-99.	-20.	0.	0.	0.	0.	0.	10.	0.	0.

ADDITIONAL SYSTEM DATA

REGR HEAT RATO	NORMAL OPERATION..... MX TM	SUPL	HT	MN TM	SUPL	HT	SETBACK OPERATION..... MX TM	SUPL	HT	MN TM	SUPL	HT	EL KY	SY KY	PCT REDUCTION IN PEAK PROCESS..... J	F	M	A	M	J	J	A	S	O	N	D	PK KY	HUMID RS HI DP	HI AM	LO AM	HM KY	AR KY	INFIL CFM	IN KY
0.0	65	53.	-10		727.		65	53.	-10		727.		0	0	0.	0.	5.	10.	12.	15.	20.	20.	15.	10.	7.	5.	0	0	0	0	0	3	3402.	1

SHUTOFF AND SETBACK TIME SCHEDULES

NO	HR,DR	HR,DR	MO/MO	HR,DR	HR,DR	MO/MO	HR,DR	HR,DR	MO/MO	HR,DR	HR,DR	MO/MO	HR,DR	HR,DR	MO/MO	HR,DR	HR,DR	MO/MO	HR,DR	HR,DR	MO/MO
1	1, 5	20, 5	1/12	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0
2	1, 7	16, 9	1/12	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0
3	1,24	0, 0	1/12	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0
4	1, 7	20, 5	1/ 3	1, 5	20, 5	4/ 9	1, 7	20, 5	10/12	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0
5	1, 8	16, 9	1/ 3	1, 7	16, 9	4/ 9	1, 8	16, 9	10/12	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0
6	1,24	0, 0	6/ 9	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0
7	1,24	0, 0	1/ 3	1,24	0, 0	11/12	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0	0, 0	0, 0	0/ 0

SETBACK TEMPERATURE SCHEDULE

NO	TEMP	MO/MO	TEMP	MO/MO	TEMP	MO/MO	TEMP	MO/MO	TEMP	MO/MO	TEMP	MO/MO
1	70	1/12	0	0/ 0	0	0/ 0	0	0/ 0	0	0/ 0	0	0/ 0

PERCENTAGE VARIATION PROFILES

1	0., 6	1., 1	5., 1	90., 1	95., 1	100., 2	75., 1	95., 1	100., 2	95., 1	60., 1	40., 1	PEOPLE WEEKDAYS
1	10., 1	5., 4	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	
2	0., 6	1., 2	5., 1	20., 3	15., 1	20., 1	15., 1	10., 1	5., 8	0., 0	0., 0	0., 0	PEOPLE SATURDAY
3	5., 6	40., 1	80., 1	100.,13	75., 3	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	LIGHTS WEEKDAYS
4	5., 9	20., 1	60., 2	40., 1	30., 1	20., 1	15., 1	10., 1	5., 8	0., 0	0., 0	0., 0	LIGHTS SATURDAY
5	5.,24	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	LIGHTS HOLIDAYS
6	0., 9	53., 3	100., 2	53., 5	20., 2	0., 3	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	
7	0., 9	10., 3	20., 2	10., 1	0., 9	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	
21	100., 1	100.,99	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	0., 0	

DAY NUMBER FOR JANUARY 1 IS 3 LEAP YEAR KEY IS 0

HOL												
	1/ 1, 0	3/ 4, 0	5/30, 0	7/ 4, 0	9/ 1, 0	10/13, 0	11/27, 0	12/25, 0	0/ 0, 0	0/ 0, 0	0/ 0, 0	0/ 0, 0

TABLE 11-146

DAY TYPE DESCRIPTION AND DISTRIBUTION

DT NO	PCT LTS	VARIATION PROFILE NUMBERS..... KEY EQP	MSC	IPR	DPR	BFA	BEB	BEC	VOA	OA	TIME SCHEDULES OA	HS	CS	SB	OP	SBT SCH	TST SCH	J F M A M J J A S O N D	S M T W T F S H
1	1	3	1	0	0	1	1	3	0	0	0	4	6	4	1	0	1	0	* * * * * * * * * * * * * * * * *
2	2	4	2	0	7	2	2	4	0	0	0	5	6	5	2	0	1	0	* * * * * * * * * * * * * * * * *
3	0	5	0	0	0	0	0	5	0	0	0	3	0	3	3	0	1	0	* * * * * * * * * * * * * * * * *

SPECIAL HOURLY PRINTOUT

MO	DAY/DAY	MO	DAY/DAY	MO	DAY/DAY	MO	DAY/DAY	PRINT KEY
0	0 0	0	0 0	0	0 0	0	0 0	0

PERCENTAGE VARIATION PROFILES

NUMBER	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
1	0.	0.	0.	0.	0.	0.	1.	5.	90.	95.	100.	100.	75.	90.	100.	100.	95.	60.	40.	10.	5.	5.	5.	5.
2	0.	0.	0.	0.	0.	0.	1.	1.	5.	20.	20.	20.	15.	20.	15.	10.	5.	5.	5.	5.	5.	5.	5.	5.
3	5.	5.	5.	5.	5.	5.	40.	80.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	75.	75.	75.
4	5.	5.	5.	5.	5.	5.	5.	5.	20.	60.	60.	40.	30.	20.	15.	10.	5.	5.	5.	5.	5.	5.	5.	5.
5	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
6	0.	0.	0.	0.	0.	0.	0.	0.	0.	53.	53.	53.	100.	100.	53.	53.	53.	53.	53.	20.	20.	0.	0.	0.
7	0.	0.	0.	0.	0.	0.	0.	0.	0.	10.	10.	10.	20.	20.	10.	0.	0.	0.	0.	0.	0.	0.	0.	0.

SHUTOFF AND SETBACK TIME SCHEDULE 1

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
FEB	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
MAR	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
APR	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
MAY	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
JUN	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
JUL	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
AUG	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
SEP	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
OCT	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
NOV	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
DEC	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1

SHUTOFF AND SETBACK TIME SCHEDULE 2

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
FEB	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
MAR	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
APR	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
MAY	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
JUN	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
JUL	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
AUG	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
SEP	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
OCT	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
NOV	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
DEC	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1

TABLE 11-147

SHUTOFF AND SETBACK TIME SCHEDULE 3

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
FEB	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MAR	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
APR	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MAY	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
JUN	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
JUL	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
AUG	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SEP	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
OCT	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
NOV	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DEC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

SHUTOFF AND SETBACK TIME SCHEDULE 4

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
FEB	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
MAR	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
APR	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
MAY	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
JUN	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
JUL	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
AUG	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
SEP	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
OCT	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
NOV	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
DEC	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1

SHUTOFF AND SETBACK TIME SCHEDULE 5

	12 M	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
FEB	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
MAR	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
APR	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
MAY	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
JUN	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
JUL	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
AUG	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
SEP	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
OCT	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
NOV	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
DEC	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1

TABLE 11-148

SHUTOFF AND SETBACK TIME SCHEDULE 6

	12 N	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FEB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
APR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JUN	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
JUL	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
AUG	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SEP	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
OCT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NOV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

SHUTOFF AND SETBACK TIME SCHEDULE 7

	12 N	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12 N	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
JAN	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
FEB	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MAR	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
APR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JUN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JUL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AUG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SEP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OCT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NOV	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DEC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

SETBACK TEMPERATURE SCHEDULE 1

70 70 70 70 70 70 70 70 70 70 70 70

TABLE 11-149

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISHMAN-B 120 TONS 95 • 73 CLEVELAND COMPOSITE WEATHER TAPE VAV ECON 04/18/79

SYSTEM TYPE 8 STD. VARIABLE VOLUME

UNIT VALUES OF INPUT DATA (FLOOR AREA = 37800. SQFT)

	LATENT	SENSIBLE	
SOLAR LOAD		11.32	BTUH/SQFT
TRANSMISSION LOSS		0.238	BTUH/F-SQFT
TRANSMISSION GAIN		0.190	BTUH/F-SQFT
TOTAL INTERNAL LOAD	1.58	15.37	BTUH/SQFT
PEOPLE	1.58	2.02	BTUH/SQFT
LIGHTS		12.80	BTUH/SQFT
EQUIPMENT		0.56	BTUH/SQFT
MISCELLANEOUS	0.0	0.0	BTUH/SQFT
MINIMUM O/A, COOLING	4.20	1.73	BTUH/SQFT
OR ...		0.100	CFM/SQFT
OR ...		7.56	PCT OF TOTAL
PEAK COOLING LOAD	5.66	33.37	BTUH/SQFT
ROOM SENS ONLY		24.61	BTUH/SQFT
TOTAL		3.25	TONS/1000 SQFT
OR ...		307.44	SQFT/TON
COOLING CAPACITY		3.17	TONS/1000 SQFT
OR ...		315.00	SQFT/TON
ROOM SENS ONLY		27.14	BTUH/SQFT
MINIMUM O/A, HEATING	0.0	7.56	BTUH/SQFT
OR ...		0.100	CFM/SQFT
OR ...		7.56	PCT OF TOTAL
PEAK HEATING LOAD	0.0	24.20	BTUH/SQFT
HEATING CAPACITY		29.79	BTUH/SQFT
TOTAL PROCESS LOAD		1.22	BTUH/SQFT
INDIRECT		1.05	BTUH/SQFT
DIRECT		0.17	BTUH/SQFT
TOTAL BASE ELEC LOAD		4.96	WATTS/SQFT
SOURCE A		0.16	WATTS/SQFT
SOURCE B		3.75	WATTS/SQFT
SOURCE C		1.05	WATTS/SQFT
TOT PRIMARY AIRFLOW		1.323	CFM/SQFT
OR ...		416.7	CFM/TON

HEATING INSIDE = 72. / 0. OUTSIDE = 2. / -8.

COOLING INSIDE = 75. /55. OUTSIDE = 91. /73.

TABLE 11-150

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISHMAN-B 120 TONS 95 * 70 CLEVELAND COMPOSITE WEATHER TAPE VAV ECON 04/18/79

MONTHLY AND ANNUAL PEAK LOAD VALUES

	PEAK HEATING, MBH		PEAK COOLING, TONS		HUMIDFCN	INDIRECT PROCESS	DIRECT PROCESS	TOT BASE ELECTRIC
	RM LOSS	COILS	RM GAIN	COILS	MBH	MBH	MBH	KW
** JAN **	899.	1716.	41.6	0.0	0.	40.	6.	167.
DAY OF MONTH	29	28	2	0	0	2	2	2
TIME OF DAY	4AM	5AM	3PM			12 N	10AM	12 N
DAY TYPE	1	1	1	0	0	1	1	1
DRY BULB TEMP	1	3	47	0	0	46	40	46
DEW POINT TEMP	-4	-4	38	0	0	37	33	37
** FEB **	893.	1662.	40.7	0.0	0.	40.	6.	170.
DAY OF MONTH	12	4	25	0	0	1	1	13
TIME OF DAY	3AM	5AM	4PM			12 N	10AM	11AM
DAY TYPE	1	1	1	0	0	1	1	1
DRY BULB TEMP	2	6	42	0	0	32	30	14
DEW POINT TEMP	-5	-1	27	0	0	26	26	2
** MAR **	786.	1235.	55.7	34.8	0.	38.	6.	169.
DAY OF MONTH	8	18	12	12	0	1	1	8
TIME OF DAY	1AM	5AM	11AM	1PM		12 N	10AM	10AM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	12	30	60	67	0	39	39	24
DEW POINT TEMP	5	26	43	45	0	34	33	15
** APR **	564.	1045.	64.0	82.2	0.	36.	6.	187.
DAY OF MONTH	4	8	29	22	0	1	1	22
TIME OF DAY	12 N	5AM	4PM	12 N		12 N	10AM	8AM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	31	34	75	72	0	59	59	68
DEW POINT TEMP	28	32	45	60	0	55	55	53
** MAY **	533.	140.	64.6	99.0	0.	35.	6.	174.
DAY OF MONTH	3	3	27	31	0	1	1	6
TIME OF DAY	4AM	4AM	10AM	3PM		12 N	10AM	8AM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	33	33	72	82	0	71	64	66
DEW POINT TEMP	29	29	44	58	0	33	32	44
** JUN **	355.	0.	76.1	120.0	0.	34.	6.	188.
DAY OF MONTH	2	0	26	15	0	3	3	17
TIME OF DAY	2AM		10AM	7AM		12 N	10AM	10AM
DAY TYPE	3	0	1	2	0	1	1	1
DRY BULB TEMP	47	0	91	74	0	75	75	85
DEW POINT TEMP	43	0	69	71	0	56	53	67

TABLE 11-151

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISHMAN-B 120 TONS 93 * 73 CLEVELAND COMPOSITE WEATHER TAPE VAV ELON 04/18/79

MONTHLY AND ANNUAL PEAK LOAD VALUES

	PEAK HEATING, MBH		PEAK COOLING, TONS		HUMIDFCN	INDIRECT PROCESS	DIRECT PROCESS	TOT BASE ELECTRIC
	RM LOSS	COILS	RM GAIN	COILS	MBH	MBH	MBH	KW
** JUL **	283.	0.	72.1	120.0	0.	32.	6.	188.
DAY OF MONTH	13	0	12	3	0	1	1	8
TIME OF DAY	4AM		5PM	5AM		12 N	10AM	10AM
DAY TYPE	1	0	1	1	0	1	1	1
DRY BULB TEMP	52	0	94	74	0	77	73	84
DEW POINT TEMP	52	0	62	70	0	57	55	67
** AUG **	368.	0.	72.9	116.9	0.	32.	6.	176.
DAY OF MONTH	24	0	27	27	0	1	1	27
TIME OF DAY	3AM		4PM	3PM		12 N	10AM	4PM
DAY TYPE	2	0	1	1	0	1	1	1
DRY BULB TEMP	45	0	90	91	0	77	73	90
DEW POINT TEMP	41	0	63	67	0	45	41	63
** SEP **	417.	0.	78.2	120.0	0.	34.	6.	181.
DAY OF MONTH	27	0	13	13	0	2	2	13
TIME OF DAY	2AM		4PM	4PM		12 N	10AM	4PM
DAY TYPE	1	0	1	1	0	1	1	1
DRY BULB TEMP	41	0	95	95	0	64	71	95
DEW POINT TEMP	40	0	62	62	0	63	63	62
** OCT **	504.	406.	65.3	100.2	0.	36.	6.	169.
DAY OF MONTH	25	25	4	4	0	1	1	4
TIME OF DAY	4AM	7AM	3PM	3PM		12 N	10AM	3PM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	34	33	82	82	0	65	63	82
DEW POINT TEMP	29	27	60	60	0	45	45	60
** NOV **	835.	1376.	50.6	59.6	0.	37.	6.	164.
DAY OF MONTH	29	28	1	13	0	1	1	11
TIME OF DAY	12 M	5AM	2PM	3PM		12 N	10AM	1PM
DAY TYPE	1	1	1	1	0	1	1	1
DRY BULB TEMP	8	16	65	69	0	62	54	49
DEW POINT TEMP	0	9	40	61	0	36	33	37
** DEC **	774.	1575.	40.9	9.3	0.	38.	6.	163.
DAY OF MONTH	21	16	4	24	0	2	2	17
TIME OF DAY	12 M	5AM	3PM	1PM		12 N	10AM	11AM
DAY TYPE	2	1	1	1	0	1	1	1
DRY BULB TEMP	13	11	50	59	0	37	36	27
DEW POINT TEMP	6	5	31	51	0	34	34	15
** ANN **	899.	1716.	78.2	120.0	0.	40.	6.	188.
MONTH OF YEAR	1	1	9	6	0	1	1	6
DAY OF MONTH	29	28	13	15	0	2	2	17
TIME OF DAY	4AM	5AM	4PM	7AM		12 N	10AM	10AM
DAY TYPE	1	1	1	2	0	1	1	1
DRY BULB TEMP	1	3	95	74	0	46	40	85
DEW POINT TEMP	-4	-4	62	71	0	37	33	67

TABLE 11-152

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLETSHMAN-B 120 TONS 90 • 70 CLEVELAND COMPOSITE WEATHER TAPE VAV ECON 04/18/79

MONTHLY AND ANNUAL LOADS

	HEATING MBTU	HEAT HOURS	COOLING TON-HRS	COOL HOURS	HUMIDFCN MBTU	IND PROC MBTU	DIR PROC MBTU	BS ELEC A KWH	BS ELEC B KWH	BS ELEC C KWH	TOT BS EL KWH	AUX F HRS
JAN	341741.	744	0.	0	0.	5902.	1430.	1373.	55003.	1235.	57611.	0
FEB	269278.	672	0.	0	0.	537[illegible].	1304.	1252.	50083.	1259.	52594.	0
MAR	230019.	740	334.	35	0.	5138.	1315.	1262.	50898.	2229.	54390.	0
APR	139655.	619	3872.	130	0.	5312.	1430.	1373.	54833.	2722.	58928.	0
MAY	87091.	583	6721.	233	0.	5194.	1430.	1373.	55003.	2987.	59363.	0
JUN	0.	0	21889.	314	0.	4597.	1315.	1262.	50728.	4886.	56876.	0
JUL	0.	0	28043.	336	0.	4721.	1430.	1373.	55003.	6417.	62793.	0
AUG	0.	0	24120.	342	0.	4747.	1441.	1383.	55308.	4445.	61137.	0
SEP	0.	0	14010.	284	0.	4793.	1367.	1312.	52628.	3612.	57553.	0
OCT	107930.	612	5090.	159	0.	5548.	1493.	1434.	57208.	3768.	62409.	0
NOV	233369.	706	882.	41	0.	5030.	1315.	1262.	50728.	1502.	53492.	0
DEC	334567.	744	45.	13	0.	5357.	1367.	1312.	52798.	1119.	55230.	0
ANN	1740648.	5420	105004.	1887	0.	61715.	16639.	15972.	640221.	36180.	692376.	0

TABLE 11-153

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISHMAN-B 120 TONS 90 * 73 CLEVELAND COMPOSITE WEATHER TAPE VAV ECON 04/18/79

	50 HR SB	MO/DY/TIME	NORM OPER	MO/DY/TIME
MIN ROOM TEMP	69.81 F	12/22/ 2AM	71.86 F	9/23/ 6AM
MAX ROOM TEMP.	88.08 F	7/21/ 7PM	75.09 F	7/ 5/ 3PM
MAX ROOM HUMIDITY RATIO	87.22 GR	7/ 8/ 3PM		

COUNT OF HOURS ON LIMITING CONDITIONS	HEATING	COOLING
SPACE LOAD NOT MET (INCL PICKUP LOAD)	1	87
SPACE LOAD NOT MET (W/O PICKUP LOAD)	1	17
SYSTEM CAPACITY EXCEEDED	0	98
LONGEST PICKUP PERIOD	1	18
LAST HOUR OF OCCURRENCE	9/23/ 6AM	7/23/ 8AM

UNIT VALUES OF BUILDING ENERGY PEAKS AND CONSUMPTION

ANNUAL EQUIVALENT ENERGY CONSUMPTION = 143972. BTU/SQFT/YR

HEATING PEAK	45.40	BTUH/SQFT
HEATING CONSUMPTION	46.05	MBTU/SQFT
FULL LOAD HEATING	1014.	HRS
COOLING PEAK	3.17	TONS/1000 SQFT
OR	315.00	SQFT/TON
COOLING CONSUMPTION	2.78	TON-HRS/SQFT
FULL LOAD COOLING	875.	HRS
PROCESS PEAK	1.22	BTUH/SQFT
PROCESS CONSUMPTION	2.07	MBTU/SQFT
INDIRECT	1.63	MBTU/SQFT
DIRECT	0.44	MBTU/SQFT
FULL LOAD PROCESS	1705.	HRS
ELECTRIC PEAK	4.96	WATTS/SQFT
ELECTRIC CONSUMPTION	18.32	KWH/SQFT
FULL LOAD ELECTRIC	3691.	HRS

PEAK HEATING LOAD DURING SETBACK = 330. MBH

MAX SUPPLY AIRFLOW IS 50000. CFM 3/ 1/ 5AM MIN SUPPLY AIRFLOW IS 5000. CFM 1/ 1/ 9AM

TABLE 11-154

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLEISHMAN-8 120 TONS 90 * 70 CLEVELAND COMPOSITE WEATHER TAPE VAV ECON 04/18/79

YRHR MO DI DB TIME DY CC DP	SOLAR RMIS	TRLOAD RMIL	BHSHRC BHSHRI	ZSHG TZSHG	DACFM DECHR	RTEMP RAT	AMAT HRRA	COST HOST	TSA/ZVFC ZVFH	CCLOAD HCLOAD	CLT HLT	D-PROC I-PROC	HUMID BELEC
*** JAN ***													
65+ 1 1 3	0.	-631056.	-761292.	-832328.	3402.	72.0	24.2	56.0	5000.	0.	0	0.	0.
5AM 28 12 -4	14514.	114.	0.	-847684.	0.0	68.0	4.5	229.0	0.	1715963.	0	0.	7.
0 0 0 0	0.	0.	0.	0.	0.	0.0	0.0	0.0	0.	0.	0	0.	0.
0 0 0	0.	0.	0.	0.	0.0	0.0	0.0	0.0	0.	0.	0	0.	0.
*** FEB ***													
822 2 1 6	0.	-574069.	-761292.	-794305.	3402.	72.0	26.2	56.0	5000.	0.	0	0.	0.
5AM 4 3 -1	14514.	-1731.	0.	-832087.	0.0	68.1	5.4	226.1	0.	1662244.	0	0.	7.
0 0 0 0	0.	0.	0.	0.	0.	0.0	0.0	0.0	0.	0.	0	0.	0.
0 0 0	0.	0.	0.	0.	0.0	0.0	0.0	0.0	0.	0.	0	0.	0.
*** MAR ***													
1430 3 1 30	0.	-360388.	-761292.	-493245.	3402.	72.0	42.9	56.0	5000.	0.	0	0.	0.
5AM 18 10 26	14514.	1395.	0.	-710813.	0.0	69.0	20.1	203.6	0.	1235494.	0	0.	7.
1694 3 1 67	327160.	-71804.	0.	633184.	34001.	75.0	67.4	56.0	34001.	417881.	0	* 5786.	0.
1PM 12 3 45	377828.	53896.	0.	698061.	0.0	79.6	46.8	56.0	0.	0.	0	37559.	160.
*** APR ***													
2334 4 1 34	0.	-324032.	-761292.	-309518.	3780.	72.0	42.9	56.0	5000.	0.	0	0.	0.
5AM 8 6 32	14514.	0.	0.	-556925.	0.0	69.1	26.6	175.1	0.	1045171.	0	0.	7.
2677 4 1 72	283621.	-26948.	0.	619939.	3780.	75.0	79.1	56.0	35292.	985822.	0	4821.	0.
12 N 22 6 60	363237.	44913.	0.	724570.	4.28	79.5	63.9	56.0	0.	0.	0	35582.	160.
*** MAY ***													
2933 5 1 33	0.	-388547.	0.	-532920.	0.	75.9	0.0	0.0	0.	0.	0	0.	0.
4AM 3 0 29	14514.	-178.	345878.	-255568.	0.0	75.1	23.2	0.0	0.	340410.	0	0.	7.
3616 5 1 82	303140.	50326.	0.	741022.	3780.	75.0	81.6	56.0	39986.	1187515.	0	6429.	0.
3PM 31 3 58	387556.	59884.	0.	820936.	3.01	81.1	64.2	56.0	0.	0.	0	18440.	168.
*** JUN ***													
0 0 0 0	0.	0.	0.	0.	0.	0.0	0.0	0.0	0.	0.	0	0.	0.
0 0 0	0.	0.	0.	0.	0.0	0.0	0.0	0.0	0.	0.	0	0.	0.
3968 6 2 74	209646.	-39306.	1284546.	185867.	3780.	77.0	81.5	56.0	50000.	1440000.	1	64.	0.
7AM 15 3 71	15487.	599.	63220.	1086760.	4.80	81.7	66.8	56.0	0.	0.	0	0.	47.

TABLE 11-155

ENERGY REQUIREMENT ESTIMATE PROGRAM FOR

FLETCHAMAN-B 120 TONS 99 = 70 CLEVELAND COMPOSITE WEATHER TAPE VAV ECON 04/18/79

YRBR TIME	MO DY	HR CC	DB DP	SOLRAD KBTS	TRLOAD KBTU	BTSHRC BHSHRT	ZSHG TZSHG	DACFH DELHR	RTEMP RAT	AMAT HKRA	COST HDST	TSA/ZVFC ZVFH	CCLOAD HCLOAD	CLT HLT	D-PROC I-PROC	HUMID BELEC
*** JUL ***																
0	0	0	0	0.	0.	0.	0.	0.	0.0	0.0	0.0	0.	0.	0	0.	0.
	0	0	0	0.	0.	0.	0.	0.0	0.0	0.0	0.0	0.	0.	0	0.	0.
4398	7	1	74	0.	-42749.	1430401.	-28235.	3780.	75.0	83.3	56.1	49014.	1440000.	0	0.	0.
5AM	3	9	70	14514.	0.	0.	973249.	4.48	83.6	66.2	56.1	0.	0.	0	0.	44.
*** AUG ***																
0	0	0	0	0.	0.	0.	0.	0.	0.0	0.0	0.0	0.	0.	0	0.	0.
	0	0	0	0.	0.	0.	0.	0.0	0.0	0.0	0.0	0.	0.	0	0.	0.
5728	8	1	91	353149.	116008.	0.	850713.	3780.	74.9	82.5	56.0	43778.	1403246.	0	6429.	0.
3PM	27	0	67	387556.	59884.	0.	898795.	5.02	81.2	64.0	56.0	0.	0.	0	16763.	175.
*** SEP ***																
0	0	0	0	0.	0.	0.	0.	0.	0.0	0.0	0.0	0.	0.	0	0.	0.
	0	0	0	0.	0.	0.	0.	0.0	0.0	0.0	0.0	0.	0.	0	0.	0.
6137	9	1	95	411325.	144553.	0.	938570.	3780.	74.9	82.5	56.0	47171.	1440000.	0	6107.	0.
4PM	13	0	62	382692.	56890.	0.	968459.	3.45	81.0	68.5	56.0	0.	0.	0	17811.	181.
*** OCT ***																
7136	10	1	33	0.	-368847.	0.	-131760.	3780.	74.3	63.8	56.0	5000.	0.	0	321.	0.
7AM	25	7	27	237038.	2994.	0.	281777.	0.0	75.6	22.5	56.0	0.	406486.	0	0.	114.
6640	10	1	82	350539.	45696.	0.	783760.	3780.	75.0	81.2	56.0	40698.	1202909.	0	6429.	0.
3PM	4	4	60	387556.	59884.	0.	835552.	3.58	80.7	64.1	56.0	0.	0.	0	18859.	169.
*** NOV ***																
7950	11	1	16	0.	-448027.	-640958.	-673079.	3402.	72.0	33.3	56.0	5000.	0.	0	0.	0.
5AM	28	10	9	14514.	-38016.	0.	-673724.	0.0	68.8	11.8	196.8	0.	1376038.	0	0.	7.
7600	11	1	69	119259.	-58075.	0.	448740.	26359.	75.0	69.4	56.0	26359.	715155.	0	6429.	0.
3PM	13	10	61	387556.	59884.	0.	541171.	18.33	79.1	65.3	56.0	0.	0.	0	19487.	154.
*** DEC ***																
8382	12	1	11	0.	-530841.	-761292.	-733401.	3402.	72.0	29.7	56.0	5000.	0.	0	0.	0.
5AM	16	10	5	14514.	196.	0.	-808355.	0.0	68.4	7.1	221.8	0.	1575163.	0	0.	7.
8582	12	1	59	212895.	-141779.	0.	448945.	30648.	74.8	59.4	56.0	30648.	111876.	0	5786.	0.
1PM	24	8	51	377828.	53896.	0.	629219.	0.0	78.1	58.3	56.0	0.	106803.	0	37559.	156.

TABLE 11-156

DOUBLE BUNDLE FULL LOAD PERFORMANCE DATA

COOLING CAPACITY	SATURATED DISCHARGE TEMP	PEAK KW
134.00	101.40	127.30
130.50	105.00	130.30
129.00	106.40	131.60
126.00	109.40	134.20
122.00	113.50	137.70
118.30	117.50	141.20
115.70	120.00	143.30
114.00	121.70	144.70
110.00	125.80	148.10
106.00	130.10	151.40
102.00	134.50	154.60

DOUBLE BUNDLE PART LOAD PERFORMANCE DATA

PERCENT OF FULL LOAD	PERCENT OF PEAK KW
10.00	10.00
20.00	17.80
25.00	21.00
30.00	25.00
40.00	36.20
50.00	44.10
60.00	54.00
70.00	65.20
75.00	69.80
80.00	73.40
90.00	88.00
100.00	100.00

PERIMETER FAN COIL RESET TEMPERATURE SCHEDULE

OUTDOOR TEMPERATURE	RESET TEMPERATURE
-30.00	120.00
-10.00	120.00
75.00	75.00
120.00	75.00

TABLE 11-157

TANK GALLONS	10000.
PUMP 1 KWIN	5.30
PUMP 2 KWIN	1.60
PUMP 3 KWIN	5.40
PUMP 4 KWIN	2.10
FAN COIL FANS KWIN	9.27
MINIMUM COOLING LOAD	0.160
HEATING SYS GPM	87.00
RECLAIM COND LOAD FAC	2.80
CONDENSER 1 LOAD	0.50
CONDENSER 2 LOAD	0.50
TEMPERATURE TOLERENCE	0.100
MIN TANK TEMPERATURE	50.00
HEAT PUMP KEY	0.
TE UPWARD RESET INCREMMENT	12.00
PERIMETER COOLING KEY	0.
MIN HOT G-UP COOL PERCENT	0.050
EFFIENCY OF FANCOIL FANS	0.550
BTUS HEAT FROM FANCOIL FANS	14237.3

1	146739.2	518.7	74754.1	498.6	12232.1	23.6	59759.5	179.9	3405.9
2	121306.7	519.5	55374.7	482.9	11389.1	23.6	54551.3	180.7	11769.7
3	111362.0	378.5	42181.4	357.8	12937.3	23.6	56280.7	176.5	48906.3
4	100703.9	361.1	28062.5	302.1	11744.5	23.6	60904.6	188.6	149419.0
5	97201.2	346.3	24693.4	154.6	11210.6	23.6	61303.9	176.8	227270.6
6	85197.3	326.3	23356.8	117.7	3222.4	10.6	58621.7	198.5	382332.4
7	96783.6	326.2	28599.0	117.7	3540.4	10.6	64649.8	197.9	464950.0
8	90272.2	305.9	23793.0	117.7	3540.4	10.6	62947.2	182.6	394510.3
9	79567.9	318.6	17446.9	125.2	2756.0	10.6	59368.4	187.9	289457.1
10	100450.6	312.3	24494.8	123.4	11488.4	23.6	64472.4	177.1	167476.4
11	116714.4	444.0	47586.1	399.0	11784.2	23.6	55351.4	176.6	40250.9
12	146734.7	477.4	77692.7	457.3	11848.2	23.6	57200.1	173.8	12536.4
	1291033.0	519.5	488032.2	498.6	107663.2	23.6	715410.9	198.5	2192282.0

CONDENSER TEMPERATURE BELOW MINIMUM
HEATING AND COOLING 346 HEATING ONLY 2186

TOTAL ANNUAL HEATING LOAD 1662954500. TOTAL ANNUAL COOLING LOAD 2268576260.

0 0 0 0 131 954

ELEC CONS OFFICE

3	1	146739.2
3	1	121306.7
3	1	111362.0
3	1	100703.9
3	1	97201.2
3	2	85197.3
3	2	96783.6
3	2	90272.2
3	2	79567.9
3	2	100450.6
3	1	116714.4
3	1	146734.7

ELEC DEMAND OFFICE

4	1	518.7
4	1	519.5
4	1	378.5
4	1	361.1
4	1	346.3
4	2	326.3
4	2	326.2
4	2	305.9
4	2	318.6
4	2	312.3
4	1	444.0
4	1	477.4

TABLE 11-158

ONLY SYSTEM NO. 1 APPLIES

EQUIPMENT ENERGY CONSUMPTION AND OPERATING DATA FOR

COOLING TOWER OPERATION

NSYS	TAPES	NPV	NTP	NCT	NBT	NGT	NES	S/KEY	T/KEY	FLOOR AREA	BASIS	RATIO	HVH	HVL	AF NAME	UNITS	HT VALUE
3	2	1	5	2	0	0	0	0	0	58400.	0	0.0	1020.	955.			0.

PART LOAD PERCENTAGE VARIATION PROFILES

NO	0.	10.	20.	25.	30.	40.	50.	60.	70.	75.	80.	90.	
1	0.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	CHILLER

AMBIENT TEMPERATURE/PERCENT OF RATED VALUE PROFILES

NO	TEMP/PCT,CWT		TEMP/PCT,CWT		TEMP/PCT,CWT		TEMP/PCT,CWT		TEMP/PCT,CWT		TEMP/PCT,CWT		KEY	
1	56./	220.0	72./	151.0	75./	127.0	78./	100.0	80./	81.0	95./	0.0	0	TWR WITH FAN CONST
2	56./	26.4	72./	18.1	75./	15.2	78./	12.0	80./	9.7	95./	0.0	0	TWR W/O FAN CONST
3	36./	220.0	52./	151.0	55./	127.0	58./	100.0	60./	81.0	75./	0.0	0	TWR WITH FAN VAR
4	36./	26.4	52./	18.1	55./	15.2	58./	12.0	60./	9.7	75./	0.0	0	TWR W/O FAN VAR
5	60./	70.0	90./	100.0	0./	0.0	0./	0.0	0./	0.0	0./	0.0	0	

CHILLER DATA

CH ID	CH TYP	MIN START	RATED TONS	MAX INPUT MBH OR KW	MAX REC HEAT MBH	MAX AF INP MBH	PILOT F INP MBH	ACCESS A KW,MBH	TY	ACCESS B KW,MBH	TY	PT LD PROF NOS PF	RH	AF	AA	AB	AMB TEMP PROF NOS OC	EI	RH	AA	AB
1	5	0.	168.0	0.	0.	0.	0.	0.	0	0.	0	1	0	0	0	0	0	0	0	0	0
2	5	0.	192.0	0.	0.	0.	0.	0.	0	0.	0	1	0	0	0	0	0	0	0	0	0

SYSTEM IDENTIFICATION LABELS

SYS 1 COOLING TOWER NO. 1 CONSTANT RETURN TEMP 85 SEC DOUBLE BUNDLE
SYS 2 COOLING TOWER NO. 2 VARIABLE RETURN TEMP 65 MIN GAS HEAT PUMP MECH
SYS 3 COOLING TOWER NO. 2 VARIABLE RETURN TEMP 65 MIN GAS HEAT PUMP ELEC

SYSTEM ACCESSORIES AND GENERAL DATA

SYS ID	ACCESSORY A KW,MBH	TY	KY	ACCESSORY B KW,MBH	TY	KY	ACCESSORY C KW,MBH	TY	KY	ACCESSORY D KW,MBH	TY	KY	TOWER FAN KW	PROF NOS WF	NF	CW	MIN TMP	FLOOR AREA	AUXILIARY FUEL DATA AF NAME	UNITS	HT VALUE
1	0.	0	0	0.	0	0	0.	0	0	0.	0	0	9.	1	2	3	0.	0.			0.
2	0.	0	0	0.	0	0	0.	0	0	0.	0	0	11.	3	4	5	65.	0.			0.
3	0.	0	0	0.	0	0	0.	0	0	0.	0	0	11.	3	4	5	65.	0.			0.

SYSTEM CHARACTERISTICS

SYS ID	TP NO	SYS MUL	GRP NO	GRP KEY	AF KEY	STM KEY	O-P KEY	PS KEY	LAT KEY	CRH SCH	LSC KEY	CHK SCH	CHILLER ID NUMBERS 1	2	3	4	5	6	7	8	CSL JAN	CSL JUL
1	1	0.0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0.	0.
2	2	0.0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0.	0.
3	3	0.0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0.	0.

SYS ID	BOILER ID NUMBERS 1	2	3	4	5	6	7	8	WHU ID	DFP ID	PCT DF	HSL JAN	HSL JUL	HT PMP LP TAPS UPPER	LOWER
1	0	0	0	0	0	0	0	0	0	0	0.	0.	0.	0	0
2	0	0	0	0	0	0	0	0	0	0	0.	0.	0.	0	0
3	0	0	0	0	0	0	0	0	0	0	0.	0.	0.	0	0

TABLE 11-159

ONLY SYSTEM NO. 1 APPLIES

EQUIPMENT ENERGY CONSUMPTION AND OPERATING DATA FOR

COOLING TOWER OPERATION

SYSTEM 1 COOLING TOWER NO. 1 CONSTANT RETURN TEMP 85 SET DOUBLE BUNDLE
SYSTEM 2 COOLING TOWER NO. 2 VARIABLE RETURN TEMP 65 MIN GAS HEAT PUMP MECH
SYSTEM 3 COOLING TOWER NO. 2 VARIABLE RETURN TEMP 65 MIN GAS HEAT PUMP ELEC

FUEL AND POWER CONSUMPTION

SYS	GAS USAGE MCF	PEAK DAY GAS MCF	ELECTRIC USAGE KWH	PEAK ELEC DEMAND (60 MIN)	AUXILIARY FUEL USAGE
** JAN **					
1	0.	0.	0.	0.	0.
2	0.	0.	0.	0.	0.
3	0.	0.	0.	0.	0.
** FEB **					
1	0.	0.	0.	1.	0.
2	0.	0.	0.	0.	0.
3	0.	0.	0.	0.	0.
** MAR **					
1	0.	0.	24.	2.	0.
2	0.	0.	29.	2.	0.
3	0.	0.	29.	2.	0.
** APR **					
1	0.	0.	127.	4.	0.
2	0.	0.	272.	8.	0.
3	0.	0.	272.	8.	0.
** MAY **					
1	0.	0.	223.	3.	0.
2	0.	0.	553.	9.	0.
3	0.	0.	553.	9.	0.
** JUN **					
1	0.	0.	826.	7.	0.
2	0.	0.	2019.	11.	0.
3	0.	0.	2019.	11.	0.
** JUL **					
1	0.	0.	1067.	7.	0.
2	0.	0.	2602.	10.	0.
3	0.	0.	2602.	10.	0.
** AUG **					
1	0.	0.	765.	6.	0.
2	0.	0.	2285.	10.	0.
3	0.	0.	2285.	10.	0.
** SEP **					
1	0.	0.	465.	6.	0.
2	0.	0.	1282.	10.	0.
3	0.	0.	1282.	10.	0.

TABLE 11-160

ONLY SYSTEM NO. 1 APPLIES

FUEL AND POWER CONSUMPTION

SYS	GAS USAGE MCF	PEAK DAY GAS MCF	ELECTRIC USAGE KWH	PEAK ELEC DEMAND (60 MIN)	AUXILIARY FUEL USAGE
** OCT **					
1	0.	0.	156.	3.	0.
2	0.	0.	472.	9.	0.
3	0.	0.	472.	9.	0.
** NOV **					
1	0.	0.	28.	3.	0.
2	0.	0.	106.	6.	0.
3	0.	0.	106.	6.	0.
** DEC **					
1	0.	0.	7.	2.	0.
2	0.	0.	4.	1.	0.
3	0.	0.	4.	1.	0.
** ANN **					
1	0.	0.	3691.	7.	0.
2	0.	0.	9624.	11.	0.
3	0.	0.	9624.	11.	0.

ONLY SYSTEM NO. 1 APPLIES

OUTPUT SUMMARY

COOLING TOWER OPERATION

SYSTEM 1 COOLING TOWER NO. 1 CONSTANT RETURN TEMP 85 SET DOUBLE BUNDLE
SYSTEM 2 COOLING TOWER NO. 2 VARIABLE RETURN TEMP 65 MIN GAS HEAT PUMP MECH
SYSTEM 3 COOLING TOWER NO. 2 VARIABLE RETURN TEMP 65 MIN GAS HEAT PUMP ELEC

UNIT VALUES OF ANNUAL UTILITY CONSUMPTION

SYS	GAS USAGE MCF/SQFT	ELEC USAGE KWH/SQFT	ELEC DMD WATTS/SQFT	AUX FUEL UNITS/SQFT
1	0.0	0.06	0.121	0.0
2	0.0	0.16	0.179	0.0
3	0.0	0.16	0.179	0.0

PEAK BOILER REQUIREMENTS FOR THE YEAR (MBH)

SYS	RECOV HEAT BOILER LOAD	SUPPLEMENTAL BOILER LOAD	COMBINED BOILER LOAD
1	0.	0.	0.
2	0.	0.	0.
3	0.	0.	0.

ANNUAL EQUIVALENT ENERGY CONSUMPTION (WITHOUT CONVERSION OR DISTRIBUTION LOSSES BY ENERGY TYPE)

SYS	BTU/SQ FT/YR
1	214.
2	559.
3	559.

TABLE 11-161

ONLY SYSTEM NO. 1 APPLIES

EQUIPMENT OPERATING HOURS

COOLING TOWER OPERATION

SYSTEM 1 COOLING TOWER NO. 1 CONSTANT RETURN TEMP 85 SET DOUBLE BUNDLE
SYSTEM 2 COOLING TOWER NO. 2 VARIABLE RETURN TEMP 65 MIN GAS HEAT PUMP MECH
SYSTEM 3 COOLING TOWER NO. 2 VARIABLE RETURN TEMP 65 MIN GAS HEAT PUMP ELEC

SYS	CHILLER OPERATING HOURS NO. 1	2	3	4	5	6	7	8	BOILER OPERATING HOURS NO. 1	2	3	4	5	6	7	8
** JAN **																
1	14															
2	535															
3	535															
** FEB **																
1	23															
2	561															
3	561															
** MAR **																
1	31															
2	700															
3	700															
** APR **																
1	189															
2	675															
3	675															
** MAY **																
1	253															
2	679															
3	679															
** JUN **																
1	304															
2	314															
3	314															
** JUL **																
1	334															
2	336															
3	336															
** AUG **																
1	334															
2	342															
3	342															
** SEP **																
1	260															
2	285															
3	265															
** OCT **																
1	209															
2	690															
3	690															
** NOV **																
1	67															
2	649															
3	649															
** DEC **																
1	20															
2	544															
3	544															
** ANN **																
1	2788															
2	6310															
3	6310															
** ANN FULL LOAD HOURS **																
1	1087															
2	1439															
3	1439															

TABLE 11-162

ONLY SYSTEM NO. 1 APPLIES

OUTPUT FILE FOR MOC PROGRAM

COOLING TOWER OPERATION

SYS	MO	GAS DEMAND MCF	GAS CONSUMP MCF	ELEC DEMAND KW	ELEC CONSUMP KWH	AUX FUEL CONSUMP	AUX FUEL HOURS	COOLING DEMAND TONS	COOLING CONSUMP TON-HRS	TOT STM DEMAND MBH	TOT STM CONSUMP MBTU
SYSTEM 1 COOLING TOWER NO. 1 CONSTANT RETURN TEMP 85 SET DOUBLE BUNDLE											
1	1	0.	0.	0.	0.	0.	0.	49.	284.	0.	0.
1	2	0.	0.	1.	3.	0.	0.	98.	981.	0.	0.
1	3	0.	0.	2.	24.	0.	0.	123.	4076.	0.	0.
1	4	0.	0.	4.	127.	0.	0.	168.	12452.	0.	0.
1	5	0.	0.	3.	223.	0.	0.	147.	18939.	0.	0.
1	6	0.	0.	7.	826.	0.	0.	153.	31861.	0.	0.
1	7	0.	0.	7.	1067.	0.	0.	153.	38746.	0.	0.
1	8	0.	0.	6.	765.	0.	0.	153.	32876.	0.	0.
1	9	0.	0.	6.	465.	0.	0.	162.	24121.	0.	0.
1	10	0.	0.	3.	156.	0.	0.	127.	13956.	0.	0.
1	11	0.	0.	3.	28.	0.	0.	146.	3354.	0.	0.
1	12	0.	0.	2.	7.	0.	0.	115.	1045.	0.	0.
SYSTEM 2 COOLING TOWER NO. 2 VARIABLE RETURN TEMP 65 MIN GAS HEAT PUMP MECH											
2	1	0.	0.	0.	0.	0.	0.	32.	6028.	0.	0.
2	2	0.	0.	0.	0.	0.	0.	33.	7701.	0.	0.
2	3	0.	0.	2.	29.	0.	0.	79.	12668.	0.	0.
2	4	0.	0.	8.	272.	0.	0.	136.	21121.	0.	0.
2	5	0.	0.	9.	553.	0.	0.	157.	28659.	0.	0.
2	6	0.	0.	11.	2019.	0.	0.	189.	38676.	0.	0.
2	7	0.	0.	10.	2602.	0.	0.	187.	47021.	0.	0.
2	8	0.	0.	10.	2285.	0.	0.	184.	42304.	0.	0.
2	9	0.	0.	10.	1282.	0.	0.	187.	27783.	0.	0.
2	10	0.	0.	9.	472.	0.	0.	160.	25571.	0.	0.
2	11	0.	0.	6.	106.	0.	0.	110.	12805.	0.	0.
2	12	0.	0.	1.	4.	0.	0.	40.	6152.	0.	0.
SYSTEM 3 COOLING TOWER NO. 2 VARIABLE RETURN TEMP 65 MIN GAS HEAT PUMP ELEC											
3	1	0.	0.	0.	0.	0.	0.	32.	6028.	0.	0.
3	2	0.	0.	0.	0.	0.	0.	33.	7701.	0.	0.
3	3	0.	0.	2.	29.	0.	0.	79.	12668.	0.	0.
3	4	0.	0.	8.	272.	0.	0.	136.	21121.	0.	0.
3	5	0.	0.	9.	553.	0.	0.	157.	28659.	0.	0.
3	6	0.	0.	11.	2019.	0.	0.	189.	38676.	0.	0.
3	7	0.	0.	10.	2602.	0.	0.	187.	47021.	0.	0.
3	8	0.	0.	10.	2285.	0.	0.	184.	42304.	0.	0.
3	9	0.	0.	10.	1282.	0.	0.	187.	27783.	0.	0.
3	10	0.	0.	9.	472.	0.	0.	160.	25571.	0.	0.
3	11	0.	0.	6.	106.	0.	0.	110.	12805.	0.	0.
3	12	0.	0.	1.	4.	0.	0.	40.	6152.	0.	0.
ANNUAL VALUES FOR ALL SYSTEMS (NOT INCLUDED ON OUTPUT FILE FOR MOC)											
1	ANN	0.	0.	7.	3691.	0.	0.	164.	182690.	0.	0.
2	ANN	0.	0.	11.	9624.	0.	0.	189.	276488.	0.	0.
3	ANN	0.	0.	11.	9624.	0.	0.	189.	276488.	0.	0.

TABLE 11-163

ONLY SYSTEM NO. 1 APPLIES — EQUIPMENT ENERGY CONSUMPTION

EQUIPMENT ENERGY CONSUMPTION AND OPERATING DATA FOR

CONVENTIONAL HEATING AND COOLING

NSYS	TAPES	NPV	NTP	NCT	NBT	NGT	NLS	S/KEY	T/KEY	FLOOR AREA	BASIS	RATIO	HVH	HVL	AF NAME	UNITS	HT VALUE
2	1	5	7	2	3	0	0	1	1	58400.	0	0.0	1020.	955.			0.

PART LOAD PERCENTAGE VARIATION PROFILES

NO	5.	10.	20.	25.	30.	40.	50.	60.	70.	75.	80.	90.	
1	0.0	10.0	17.8	21.0	25.0	36.2	44.1	54.0	65.2	69.8	73.7	88.0	RECIP CHILLER
2	0.0	10.0	20.0	25.0	30.0	40.0	50.0	60.0	70.0	75.0	80.0	90.0	ELEC BOILER
3	0.0	19.1	28.6	32.7	36.9	45.1	53.7	62.5	71.8	76.5	81.2	90.6	GAS BOILER
4	0.0	10.0	20.0	25.0	30.0	40.0	50.0	60.0	70.0	75.0	80.0	90.0	HP CHILLER
5	0.0	10.0	20.0	25.0	30.0	40.0	50.0	60.0	70.0	75.0	80.0	90.0	HP BOILER

AMBIENT TEMPERATURE/PERCENT OF RATED VALUE PROFILES

NO	TEMP/PCT,CWT	TEMP/PCT,CWT	TEMP/PCT,CWT	TEMP/PCT,CWT	TEMP/PCT,CWT	TEMP/PCT,CWT	KEY	
1	56./ 220.0	72./ 151.0	75./ 127.0	78./ 100.0	80./ 81.0	95./ 0.0	0	TWR WITH FAN CONST
2	56./ 26.4	72./ 18.1	75./ 15.2	78./ 12.0	80./ 9.7	95./ 0.0	0	TWR W/O FAN CONST
3	75./ 106.0	85./ 100.0	95./ 95.0	0./ 0.0	0./ 0.0	0./ 0.0	0	HP CHILLER
4	60./ 89.6	70./ 100.0	80./ 110.0	0./ 0.0	0./ 0.0	0./ 0.0	0	HP BOILER
5	75./ 94.4	85./ 100.0	95./ 106.0	0./ 0.0	0./ 0.0	0./ 0.0	0	HP CHILLER INPUT
6	75./ 102.0	85./ 100.0	95./ 96.3	0./ 0.0	0./ 0.0	0./ 0.0	0	HP CHILLER REJ HT
7	60./ 89.5	70./ 100.0	80./ 110.0	0./ 0.0	0./ 0.0	0./ 0.0	0	HP BOILER INPUT

CHILLER DATA

CH ID	CH TYP	MIN START	RATED TONS	MAX INPUT MBH OR KW	MAX REC HEAT MBH	MAX AF INP MBH	PILOT F INP MBH	ACCESS A KW,MBH	TY	ACCESS B KW,MBH	TY	PT LD PROF NOS PF	RH	AF	AA	AB	AMB TEMP PROF NOS DC	EI	RH	AA	AB
1	5	17.	130.5	130.	0.	0.	0.	0.	0	0.	0	1	0	0	0	0	0	0	0	0	0
2	5	10.	120.6	179.	2100.	0.	0.	0.	0	0.	0	4	4	0	0	0	3	5	6	C	0

BOILER, PROCESS OR HEAT PUMP EQUIPMENT DATA

BL ID	BL TYPE	RATED OUTPUT MBH	MAX INPUT MBH,KW	ACCESS A KW,MBH	TY	ACCESS B KW,MBH	TY	PT LD PROF NOS EI	AA	AB	HT PUMP PERCENT	HTP KEY	AMB PROFILES OUTPUT	INPUT
1	0	915.	1126.	0.	0	0.	0	3	0	0	0.0	0	0	0
2	7	491.	158.	0.	0	0.	0	5	0	0	23.0	0	4	7
3	2	666.	195.	0.	0	0.	0	2	0	0	0.0	0	0	0

SYSTEM IDENTIFICATION LABELS

SYS 1 RECIP CHILLER WITH GAS BOILER
SYS 2 CALIFORNIA HEAT PUMP SYSTEM

SYSTEM ACCESSORIES AND GENERAL DATA

SYS ID	ACCESSORY A KW,MBH	TY	KY	ACCESSORY B KW,MBH	TY	KY	ACCESSORY C KW,MBH	TY	KY	ACCESSORY D KW,MBH	TY	KY	TOWER FAN KW	PROF NOS WF	NF	CW	MIN TMP	FLOOR AREA	AUXILIARY FUEL DATA AF NAME	UNITS	HT VALUE
1	3.	0	2	5.	0	3	5.	0	3	0.	0	0	9.	1	2	0	0.	0.			0.
2	9.	0	1	0.	0	0	0.	0	0	0.	0	0	15.	1	2	0	0.	0.			0.

CONSOLIDATED NATURAL GAS SERVICE COMPANY

TABLE 11-164

ONLY SYSTEM NO. 1 APPLIES

SYSTEM CHARACTERISTICS

SYS ID	TP ID	SYS APL	GRP NO	GRP KEY	AP KEY	SIM KEY	O-P KEY	PS KEY	LMT KEY	CRH SCH	LSC KEY	CHR SCH	CHILLER ID NUMBERS 1	2	3	4	5	6	7	8	CSL JAN	CSL JUL
1	1	0.0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0.	0.
2	2	0.0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0.	0.

SYS ID	BOILER ID NUMBERS 1	2	3	4	5	6	7	8	WHB ID	DFP ID	PCT DF	HSL JAN	HSL JUL	HT PMP UPPER	LP TMPS LOWER
1	1	2	0	0	0	0	0	0	0	0	0.	0.	0.	0	0
2	2 (3)	0	0	0	0	0	0	0	0	0	0.	0.	0.	90	70

ONLY SYSTEM NO. 1 APPLIES

EQUIPMENT ENERGY CONSUMPTION AND OPERATING DATA FOR

CONVENTIONAL HEATING AND COOLING

SYSTEM 1 RECIP CHILLER WITH GAS BOILER
SYSTEM 2 CALIFORNIA HEAT PUMP SYSTEM

FUEL AND POWER CONSUMPTION

SYS	GAS USAGE MCF	PEAK DAY GAS MCF	ELECTRIC USAGE KWH	PEAK ELEC DEMAND (60 MIN)	AUXILIARY FUEL USAGE
** JAN **					
1	453.	25.	60597.	172.	0.
2	0.	0.	161012.	442.	0.
** FEB **					
1	368.	21.	55294.	175.	0.
2	0.	0.	134607.	483.	0.
** MAR **					
1	333.	16.	57926.	217.	0.
2	0.	0.	128033.	357.	0.
** APR **					
1	226.	12.	66103.	249.	0.
2	0.	0.	114332.	325.	0.
** MAY **					
1	167.	8.	69974.	274.	0.
2	0.	0.	105670.	287.	0.
** JUN **					
1	11.	1.	81152.	323.	0.
2	0.	0.	88045.	321.	0.
** JUL **					
1	11.	0.	93371.	322.	0.
2	0.	0.	99723.	319.	0.
** AUG **					
1	11.	0.	87388.	305.	0.
2	0.	0.	93979.	313.	0.
** SEP **					
1	11.	1.	73641.	315.	0.
2	0.	0.	81811.	318.	0.
** OCT **					
1	192.	13.	73981.	277.	0.
2	0.	0.	109218.	289.	0.
** NOV **					
1	330.	19.	57488.	220.	0.
2	0.	0.	127372.	407.	0.
** DEC **					
1	[illegible]	22.	[illegible]	193.	0.
2	[illegible]	0.	[illegible]	481.	0.
** ANN **					
1	2557.	25.	832280.	323.	0.
2	0.	0.	1401514.	483.	0.

TABLE 11-165

ONLY SYSTEM NO. 1 APPLIES

OUTPUT SUMMARY

CONVENTIONAL HEATING AND COOLING

SYSTEM 1 RECIP CHILLER WITH GAS BOILER
SYSTEM 2 CALIFORNIA HEAT PUMP SYSTEM

UNIT VALUES OF ANNUAL UTILITY CONSUMPTION

SYS	GAS USAGE MCF/SQFT	ELEC USAGE KWH/SQFT	ELEC DMD WATTS/SQFT	AUX FUEL UNITS/SQFT
1	0.0435	14.15	5.493	0.0
2	0.0	23.84	8.221	0.0

PEAK BOILER REQUIREMENTS FOR THE YEAR (MBH)

SYS	RECIV HEAT BOILER LOAD	SUPPLEMENTAL BOILER LOAD	COMBINED BOILER LOAD
1	0.	1716.	1716.
2	452.	1323.	1716.

ANNUAL EQUIVALENT ENERGY CONSUMPTION (WITHOUT CONVERSION OR DISTRIBUTION LOSSES BY ENERGY TYPE)

SYS	BTU/SQ FT/YR
1	92658.
2	81350.

TABLE 11-166

ONLY SYSTEM NO. 1 APPLIES

EQUIPMENT OPERATING HOURS

CONVENTIONAL HEATING AND COOLING

SYSTEM 1 RECIP CHILLER WITH GAS BOILER
SYSTEM 2 CALIFORNIA HEAT PUMP SYSTEM

SYS	CHILLER OPERATING HOURS NO. 1	2	3	4	5	6	7	8	BOILER OPERATING HOURS NO. 1	2	3	4	5	6	7	8
** JAN **																
1	0								744							
2	170								744	586						
** FEB **																
1	0								672							
2	181								672	497						
** MAR **																
1	10								741							
2	212								741	532						
** APR **																
1	95								681							
2	294								681	389						
** MAY **																
1	156								686							
2	325								686	366						
** JUN **																
1	285								270							
2	311								270	40						
** JUL **																
1	330								298							
2	334								298	44						
** AUG **																
1	321								294							
2	336								294	45						
** SEP **																
1	223								276							
2	267								276	54						
** OCT **																
1	113								692							
2	286								692	408						
** NOV **																
1	23								717							
2	191								717	530						
** DEC **																
1	2								744							
2	162								744	594						
** ANN **																
1	1558								6805							
2	3069								6805	4585						
** ANN FULL LOAD HOURS **																
1	804								1969							
2	1413								844	1576						

TABLE 11-167

ONLY SYSTEM NO. 1 APPLIES

THERMAL MATCHING INFORMATION

CONVENTIONAL HEATING AND COOLING

SYSTEM 1 RECIP CHILLER WITH GAS BOILER
SYSTEM 2 CALIFORNIA HEAT PUMP SYSTEM

SYS	THERMAL ENERGY REQ,MBTU (1)	SUPPLIED ENERGY SUPLD,MBTU (2)	RECOVERABLE HEAT AVAIL MBTU	RECOVERABLE HEAT USED MBTU
** JAN **				
1	347631.	361801.	0.	0.
2	427574.	333317.	163974.	59687.
** FEB **				
1	274644.	374928.	0.	0.
2	351679.	263400.	116628.	48383.
** MAR **				
1	239163.	340781.	0.	0.
2	356267.	235140.	165824.	48278.
** APR **				
1	191525.	242240.	0.	0.
2	329253.	175654.	252573.	37879.
** MAY **				
1	172931.	193539.	0.	0.
2	310284.	144920.	298862.	26870.
** JUN **				
1	267247.	79769.	0.	0.
2	333326.	137246.	439603.	3333.
** JUL **				
1	341224.	95931.	0.	0.
2	367492.	129963.	497332.	3421.
** AUG **				
1	294181.	85917.	0.	0.
2	313516.	110833.	423289.	3438.
** SEP **				
1	172999.	54566.	0.	0.
2	231237.	81773.	310425.	3368.
** OCT **				
1	174552.	211575.	0.	0.
2	292539.	149365.	245389.	30124.
** NOV **				
1	245974.	339255.	0.	0.
2	323364.	236331.	137106.	37707.
** DEC **				
1	393453.	453137.	0.	0.
2	413347.	327450.	100020.	46304.
** ANN **				
1	3062353.	2933484.	0.	0.
2	4034889.	2295101.	3358220.	339652.

(1) ENERGY REQUIREMENT WHICH COULD BE MET BY STEAM IF DESIRED
(2) BTU EQUIVALENT OF INPUT ENERGY USED TO MEET (1) REGARDLESS OF METHOD

TABLE 11-168

ONLY SYSTEM NO. 1 APPLIES

HOURS THAT LOADS EXCEED EQUIPMENT CAPACITY

		COOLING			HEATING			ELECTRICAL		
SYS	MO	HOURS	MAXIMUM	AT HR	HOURS	MAXIMUM BTU/H	AT HR	HOURS	MAXIMUM	AT HR
1	JAN	0	0.	0	53	4583896.	655	0	0.	0
1	FEB	0	0.	0	34	2905181.	824	0	0.	0
1	MAR	0	0.	0	5	1368579.	1831	0	0.	0
1	APR	0	0.	0	2	1045171.	2334	0	0.	0
1	NOV	0	0.	0	18	1752638.	7951	0	0.	0
1	DEC	0	0.	0	57	3419366.	8383	0	0.	0
2	JAN	0	0.	0	60	3974455.	656	0	0.	0
2	FEB	0	0.	0	40	2643544.	824	0	0.	0
2	MAR	0	0.	0	6	1111236.	1831	0	0.	0
2	APR	0	0.	0	2	809597.	2335	0	0.	0
2	NOV	0	0.	0	20	1391534.	7951	0	0.	0
2	DEC	0	0.	0	43	3194477.	8383	0	0.	0

ONLY SYSTEM NO. 1 APPLIES

OUTPUT FILE FOR MUCI PROGRAM

CONVENTIONAL HEATING AND COOLING

SYS	MO	GAS DEMAND MCF	GAS CONSUMP MCF	ELEC DEMAND KW	ELEC CONSUMP KWH	AUX FUEL CONSUMP	AUX FUEL HOURS	COOLING DEMAND TONS	COOLING CONSUMP TON-HRS	TOT STM DEMAND MBH	TOT STM CONSUMP MBTU
SYSTEM 1 RECIP CHILLER WITH GAS BOILER											
1	1	25.	453.	172.	60597.	0.	0.	0.	0.	4584.	347644.
1	2	21.	368.	175.	55296.	0.	0.	0.	0.	2905.	274652.
1	3	16.	333.	217.	57926.	0.	0.	41.	334.	1389.	235157.
1	4	12.	224.	249.	66133.	0.	0.	82.	3872.	1045.	144966.
1	5	5.	167.	274.	69745.	0.	0.	99.	6721.	340.	92285.
1	6	1.	11.	323.	81152.	0.	0.	120.	21889.	34.	4597.
1	7	0.	11.	322.	93371.	0.	0.	120.	28043.	32.	4721.
1	8	0.	11.	305.	87333.	0.	0.	117.	24123.	32.	4747.
1	9	1.	11.	315.	73641.	0.	0.	120.	14010.	34.	4793.
1	10	10.	192.	277.	70981.	0.	0.	100.	5090.	406.	113477.
1	11	19.	330.	220.	57488.	0.	0.	60.	882.	1753.	235399.
1	12	22.	414.	193.	58365.	0.	0.	28.	45.	3419.	339924.
SYSTEM 2 CALIFORNIA HEAT PUMP SYSTEM											
2	1	0.	0.	442.	161012.	0.	0.	92.	6624.	3974.	217390.
2	2	0.	0.	433.	134837.	0.	0.	83.	7223.	2644.	163351.
2	3	0.	0.	357.	128533.	0.	0.	80.	10080.	1111.	132938.
2	4	0.	0.	325.	114332.	0.	0.	120.	15353.	810.	73607.
2	5	0.	0.	267.	105670.	0.	0.	117.	18167.	262.	44397.
2	6	0.	0.	321.	86049.	0.	0.	120.	24899.	5.	207.
2	7	0.	0.	319.	99723.	0.	0.	120.	30232.	5.	214.
2	8	0.	0.	313.	93979.	0.	0.	120.	25731.	5.	217.
2	9	0.	0.	348.	81811.	0.	0.	120.	19870.	14.	323.
2	10	0.	0.	299.	109218.	0.	0.	99.	14917.	315.	57307.
2	11	0.	0.	407.	127372.	0.	0.	94.	7727.	1392.	143756.
2	12	0.	0.	481.	157013.	0.	0.	77.	6080.	3194.	215774.
ANNUAL VALUES FOR ALL SYSTEMS (NOT INCLUDED ON OUTPUT FILE FOR MUCI)											
1	ANN	25.	2557.	323.	632280.	0.	0.	120.	105004.	4584.	1802358.
2	ANN	0.	0.	483.	1401514.	0.	0.	120.	185905.	3974.	1049670.

TABLE 11-169

ONLY SYSTEM NO. 1 APPLIES

ENERGY USAGE BY SOURCE

CONVENTIONAL HEATING AND COOLING

SYS	MO	GAS ENGINES MCF	GAS BOILER MCF	GAS PROCESS MCF	ELECTRIC BASE KWH	ELECTRIC ACC KWH	ELECTRIC HEATING KWH	ELECTRIC COOLING KWH	ELECTRIC PROCESS KWH
SYSTEM 1 RECIP CHILLER WITH GAS BOILER									
1	1	0.	433.	0.	57611.	2567.	0.	0.	419.
1	2	0.	368.	0.	52593.	2314.	0.	0.	382.
1	3	0.	333.	0.	54390.	2679.	0.	272.	385.
1	4	0.	226.	0.	58028.	3379.	0.	3377.	419.
1	5	0.	167.	0.	59363.	4265.	0.	5928.	419.
1	6	0.	11.	0.	56876.	3679.	0.	20215.	385.
1	7	0.	11.	0.	62793.	4126.	0.	26037.	419.
1	8	0.	11.	0.	61137.	3921.	0.	21913.	422.
1	9	0.	11.	0.	57553.	2995.	0.	12696.	401.
1	10	0.	192.	0.	62409.	3663.	0.	4473.	438.
1	11	0.	333.	0.	53432.	2827.	0.	783.	385.
1	12	0.	449.	0.	55233.	2688.	0.	46.	401.
1	YR	0.	2557.	0.	692376.	39307.	0.	95741.	4875.
SYSTEM 2 CALIFORNIA HEAT PUMP SYSTEM									
2	1	0.	0.	0.	56376.	6562.	89407.	8253.	419.
2	2	0.	0.	0.	51335.	5924.	68174.	9033.	382.
2	3	0.	0.	0.	52153.	6503.	56337.	12559.	385.
2	4	0.	0.	0.	56226.	6246.	32340.	19129.	419.
2	5	0.	0.	0.	56376.	6418.	19826.	22635.	419.
2	6	0.	0.	0.	51990.	4251.	400.	31323.	385.
2	7	0.	0.	0.	56376.	4354.	412.	37667.	419.
2	8	0.	0.	0.	56428.	4397.	414.	32063.	422.
2	9	0.	0.	0.	53941.	3514.	449.	23511.	401.
2	10	0.	0.	0.	59642.	6381.	25179.	18585.	438.
2	11	0.	0.	0.	51990.	6347.	59530.	9627.	385.
2	12	0.	0.	0.	54111.	6565.	88365.	7575.	401.
2	YR	0.	0.	0.	656195.	68060.	443833.	231622.	4875.

TABLE 11-170

ONLY SYSTEM NO. 1 APPLIES

EQUIPMENT ENERGY CONSUMPTION AND OPERATING DATA FOR

CONVENTIONAL HEATING AND COOLING

NSYS	TAPES	NPV	NTP	NCT	NBT	NGT	NLS	S/KEY	T/KEY	FLOOR AREA	BASIS	RATIO	HVH	HVL	AF NAME	UNITS	HT VALUE
2	1	5	7	2	3	0	0	1	1	58800.	0	0.0	1020.	955.			0.

PART LOAD PERCENTAGE VARIATION PROFILES

NO	0.	10.	20.	25.	30.	40.	50.	60.	70.	75.	80.	90.	
1	0.0	10.0	17.8	21.0	25.0	36.2	44.1	54.0	65.2	69.8	73.7	88.0	RECIP CHILLER
2	0.0	10.0	20.0	25.0	30.0	40.0	50.0	60.0	70.0	75.0	80.0	90.0	ELEC BOILER
3	0.0	19.1	28.6	32.7	36.9	45.1	53.7	62.5	71.8	76.5	81.2	90.6	GAS BOILER
4	0.0	10.0	20.0	25.0	30.0	40.0	50.0	60.0	70.0	75.0	80.0	90.0	HP CHILLER
5	0.0	10.0	20.0	25.0	30.0	40.0	50.0	60.0	70.0	75.0	80.0	90.0	HP BOILER

AMBIENT TEMPERATURE/PERCENT OF RATED VALUE PROFILES

NO	TEMP/PCT,CWT		TEMP/PCT,CWT		TEMP/PCT,CWT		TEMP/PCT,CWT		TEMP/PCT,CWT		TEMP/PCT,CWT		KEY	
1	56./	220.0	72./	151.0	75./	127.0	78./	100.0	80./	81.0	95./	0.0	0	TWR WITH FAN CONST
2	56./	26.4	72./	18.1	75./	15.2	78./	12.0	80./	9.7	95./	0.0	0	TWR W/O FAN CONST
3	75./	106.0	85./	100.0	95./	95.0	0./	0.0	0./	0.0	0./	0.0	0	HP CHILLER
4	65./	89.6	70./	100.0	80./	110.0	0./	0.0	0./	0.0	0./	0.0	0	HP BOILER
5	75./	94.4	85./	100.0	95./	106.0	0./	0.0	0./	0.0	0./	0.0	0	HP CHILLER INPUT
6	75./	102.0	85./	100.0	95./	96.3	0./	0.0	0./	0.0	0./	0.0	0	HP CHILLER REJ HT
7	60./	89.5	70./	100.0	80./	110.0	0./	0.0	0./	0.0	0./	0.0	0	HP BOILER INPUT

CHILLER DATA

CH ID	CH TYP	MIN START	RATED TONS	MAX INPUT MBH OR KW	MAX REC HEAT MBH	MAX AF INP MBH	PILOT F INP MBH	ACCESS A KW,MBH	TY	ACCESS B KW,MBH	TY	PT	LD	PROF NOS AF	AA	AB	AMB TEMP PROF NOS DC	EI	RH	AA	AB
1	5	17.	130.5	130.	0.	0.	0.	0.	0	0.	0	1	0	0	0	0	0	0	0	0	0
2	5	10.	120.6	179.	2100.	0.	0.	0.	0	0.	0	4	4	0	0	0	3	5	6	0	0

BOILER, PROCESS OR HEAT PUMP EQUIPMENT DATA

BL ID	BL TYPE	RATED OUTPUT MBH	MAX INPUT MBH,KW	ACCESS A Kw,MBH	TY	ACCESS B KW,MBH	TY	PT	LD	PROF NOS AA	AB	HT PUMP PERCENT	HTP KEY	AMB PROFILES OUTPUT	INPUT
1	2	1126.	330.	0.	0	0.	0	2	0	0		0.0	0	0	0
2	7	491.	158.	0.	0	0.	0	5	0	0		23.0	0	4	7
3	2	666.	195.	0.	0	0.	0	2	0	0		0.0	0	0	0

SYSTEM IDENTIFICATION LABELS

SYS 1 RECIP CHILLER WITH ELEC BOILER

SYS 2 CALIFORNIA HEAT PUMP SYSTEM

SYSTEM ACCESSORIES AND GENERAL DATA

SYS ID	ACCESSORY A KW,MBH	TY	KY	ACCESSORY B KW,MBH	TY	KY	ACCESSORY C KW,MBH	TY	KY	ACCESSORY D KW,MBH	TY	KY	TOWER FAN KW	PROF NOS WF	NF	CW	MIN TMP	FLOOR AREA	AUXILIARY FUEL DATA AF NAME	UNITS	HT VALUE
1	0.	0	2	5.	0	3	5.	0	3	0.	0	0	9.	1	2	0	0.	0.			0.
2	4.	0	1	0.	0	0	0.	0	0	0.	0	0	15.	1	2	0	0.	0.			0.

SYSTEM CHARACTERISTICS

SYS ID	TP NO	SYS MUL	GRP NO	GRP KEY	AF KEY	STM KEY	O-P KEY	PS KEY	LMT KEY	CRH SCH	LSC KEY	CHR SCH	CHILLER ID NUMBERS 1	2	3	4	5	6	7	8	CSL JAN	CSL JUL
1	1	0.0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0.	0.
2	2	0.0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0.	0.

SYS ID	BOILER ID NUMBERS 1	2	3	4	5	6	7	8	WHB ID	DFP ID	PCT DF	HSL JAN	HSL JUL	HT PMP &P TAPS UPPER	LOWER
1	1	0	0	0	0	0	0	0	0	0	0.	0.	0.	0	0
2	2	3	0	0	0	0	0	0	0	0	0.	0.	0.	90	70

TABLE 11-171

ONLY SYSTEM NO. 1 APPLIES

EQUIPMENT ENERGY CONSUMPTION AND OPERATING DATA FOR

CONVENTIONAL HEATING AND COOLING

SYSTEM 1 RECIP CHILLER WITH ELEC BOILER
SYSTEM 2 CALIFORNIA HEAT PUMP SYSTEM

FUEL AND POWER CONSUMPTION

SYS	GAS USAGE MCF	PEAK DAY GAS MCF	ELECTRIC USAGE KWH	PEAK ELEC DEMAND (60 MIN)	AUXILIARY FUEL USAGE
** JAN **					
1	0.	0.	162475.	483.	0.
2	0.	0.	161012.	442.	0.
** FEB **					
1	0.	0.	135779.	483.	0.
2	0.	0.	134807.	483.	0.
** MAR **					
1	0.	0.	126836.	390.	0.
2	0.	0.	128033.	357.	0.
** APR **					
1	0.	0.	108580.	317.	0.
2	0.	0.	114332.	325.	0.
** MAY **					
1	0.	0.	97015.	280.	0.
2	0.	0.	105670.	287.	0.
** JUN **					
1	0.	0.	82499.	330.	0.
2	0.	0.	88645.	321.	0.
** JUL **					
1	0.	0.	94754.	331.	0.
2	0.	0.	99723.	319.	0.
** AUG **					
1	0.	0.	88779.	310.	0.
2	0.	0.	93979.	313.	0.
** SEP **					
1	0.	0.	75046.	320.	0.
2	0.	0.	81811.	318.	0.
** OCT **					
1	0.	0.	104234.	282.	0.
2	0.	0.	109218.	289.	0.
** NOV **					
1	0.	0.	126470.	447.	0.
2	0.	0.	127872.	467.	0.
** DEC **					
1	0.	0.	[illegible]	482.	0.
2	0.	0.	[illegible]	501.	0.
** ANN **					
1	0.	0.	1360446.	483.	0.
2	0.	0.	1401524.	483.	0.

TABLE 11-172

ONLY SYSTEM NO. 1 APPLIES

OUTPUT SUMMARY

CONVENTIONAL HEATING AND COOLING

SYSTEM 1 RECIP CHILLER WITH ELEC BOILER
SYSTEM 2 CALIFORNIA HEAT PUMP SYSTEM

UNIT VALUES OF ANNUAL UTILITY CONSUMPTION

SYS	GAS USAGE MCF/SQFT	ELEC USAGE KWH/SQFT	ELEC DMD WATTS/SQFT	AUX FUEL UNITS/SQFT
1	0.0	23.14	8.220	0.0
2	0.0	23.94	8.221	0.0

PEAK BOILER REQUIREMENTS FOR THE YEAR (MBH)

SYS	RECOV HEAT BOILER LOAD	SUPPLEMENTAL BOILER LOAD	COMBINED BOILER LOAD
1	0.	1716.	1716.
2	492.	1323.	1718.

ANNUAL EQUIVALENT ENERGY CONSUMPTION (WITHOUT CONVERSION OR DISTRIBUTION LOSSES BY ENERGY TYPE)

SYS	BTU/SQ FT/YR
1	78966.
2	81350.

TABLE 11-173

ONLY SYSTEM NO. 1 APPLIES

EQUIPMENT OPERATING HOURS

CONVENTIONAL HEATING AND COOLING

SYSTEM 1 RECIP CHILLER WITH ELEC BOILER
SYSTEM 2 CALIFORNIA HEAT PUMP SYSTEM

SYS	CHILLER OPERATING HOURS NO. 1	2	3	4	5	6	7	8	BOILER OPERATING HOURS NO. 1	2	3	4	5	6	7	8
** JAN **																
1	0								744							
2	170								744	586						
** FEB **																
1	2								672							
2	181								672	497						
** MAR **																
1	10								741							
2	212								741	532						
** APR **																
1	95								681							
2	294								681	389						
** MAY **																
1	156								686							
2	325								686	366						
** JUN **																
1	265								270							
2	311								270	43						
** JUL **																
1	320								288							
2	334								288	44						
** AUG **																
1	321								294							
2	336								294	45						
** SEP **																
1	223								276							
2	267								276	54						
** OCT **																
1	113								692							
2	286								692	408						
** NOV **																
1	23								717							
2	191								717	530						
** DEC **																
1	2								744							
2	102								744	594						
** ANN **																
1	1553								6805							
2	3069								6805	4085						
** ANN FULL LOAD HOURS **																
1	604								1599							
2	1413								1599	1576						

TABLE 11-174

ONLY SYSTEM NO. 1 APPLIES

THERMAL MATCHING INFORMATION

CONVENTIONAL HEATING AND COOLING

SYSTEM 1 RECIP CHILLER WITH ELEC BOILER
SYSTEM 2 CALIFORNIA HEAT PUMP SYSTEM

SYS	THERMAL ENERGY REQ,MBTU (1)	SUPLMTL ENERGY SUPLD,MBTU (2)	RECOVRBL HEAT AVAIL MBTU	RECOVRBL HEAT USED MBTU
** JAN **				
1	347631.	347732.	0.	0.
2	427574.	333317.	108974.	50687.
** FEB **				
1	274648.	274725.	0.	0.
2	361609.	263400.	118828.	48383.
** MAR **				
1	239163.	238145.	0.	0.
2	356267.	235147.	165824.	48278.
** APR **				
1	191425.	156530.	0.	0.
2	327253.	175664.	252570.	37879.
** MAY **				
1	172931.	112540.	0.	0.
2	310289.	144920.	298862.	26670.
** JUN **				
1	267267.	73591.	0.	0.
2	303386.	107246.	409603.	3333.
** JUL **				
1	341273.	93586.	0.	0.
2	367492.	125963.	497332.	3421.
** AUG **				
1	294181.	79538.	0.	0.
2	313516.	110833.	423289.	3438.
** SEP **				
1	172909.	48124.	0.	0.
2	231237.	81771.	310425.	3368.
** OCT **				
1	174552.	128774.	0.	0.
2	292530.	149365.	245389.	30124.
** NOV **				
1	[illegible]	[illegible]	0.	0.
2	[illegible]	[illegible]	[illegible]	37707.
** DEC **				
1	340450.	340167.	0.	0.
2	413347.	327450.	130020.	46364.
** ANN **				
1	3062350.	2129581.	0.	0.
2	4331859.	2295101.	3058220.	339652.

(1) ENERGY REQUIREMENT WHICH COULD BE MET BY STEAM IF DESIRED
(2) BTU EQUIVALENT OF INPUT ENERGY USED TO MEET (1) REGARDLESS OF METHOD

TABLE 11-175

ONLY SYSTEM NO. 1 APPLIES

HOURS THAT LOADS EXCEED EQUIPMENT CAPACITY

		COOLING			HEATING			ELECTRICAL		
SYS	MO	HOURS	MAXIMUM	AT HR	HOURS	MAXIMUM	AT HR	HOURS	MAXIMUM	AT HR
1	JAN	0	0.	0	23	2532351.	655	0	0.	0
1	FEB	0	0.	0	10	2185439.	823	0	0.	0
1	MAR	0	0.	0	3	1235494.	1830	0	0.	0
1	NOV	0	0.	0	9	1541488.	7951	0	0.	0
1	DEC	0	0.	0	11	1836928.	8383	0	0.	0
2	JAN	0	0.	0	60	3974455.	656	0	0.	0
2	FEB	0	0.	0	40	2643544.	824	0	0.	0
2	MAR	0	0.	0	6	1111286.	1831	0	0.	0
2	APR	0	0.	0	2	809590.	2335	0	0.	0
2	NOV	0	0.	0	20	1391584.	7951	0	0.	0
2	DEC	0	0.	0	43	3194477.	8383	0	0.	0

ONLY SYSTEM NO. 1 APPLIES

OUTPUT FILE FOR MOC PROGRAM

CONVENTIONAL HEATING AND COOLING

SYS	MO	GAS DEMAND MCF	GAS CONSUMP MCF	ELEC DEMAND KW	ELEC CONSUMP KWH	AUX FUEL CONSUMP	AUX FUEL HOURS	COOLING DEMAND TONS	COOLING CONSUMP TON-HRS	TOT STM DEMAND MBH	TOT STM CONSUMP MBTU
SYSTEM 1 RECIP CHILLER WITH ELEC BOILER											
1	1	0.	0.	483.	162475.	0.	0.	0.	0.	2532.	347644.
1	2	0.	0.	483.	135779.	0.	0.	0.	0.	2385.	274652.
1	3	0.	0.	390.	126836.	0.	0.	41.	334.	1235.	235157.
1	4	0.	0.	317.	108580.	0.	0.	82.	3872.	1045.	144966.
1	5	0.	0.	283.	57315.	0.	0.	99.	6721.	340.	92285.
1	6	0.	0.	330.	82499.	0.	0.	120.	21889.	34.	4597.
1	7	0.	0.	331.	94754.	0.	0.	120.	28043.	32.	4721.
1	8	0.	0.	310.	88779.	0.	0.	117.	24120.	32.	4747.
1	9	0.	0.	320.	75046.	0.	0.	120.	14010.	34.	4793.
1	10	0.	0.	282.	104234.	0.	0.	100.	5090.	406.	113477.
1	11	0.	0.	457.	126470.	0.	0.	60.	882.	1541.	235399.
1	12	0.	0.	482.	157931.	0.	0.	28.	45.	1839.	339924.
SYSTEM 2 CALIFORNIA HEAT PUMP SYSTEM											
2	1	0.	0.	442.	161012.	0.	0.	92.	6624.	3974.	217380.
2	2	0.	0.	483.	134807.	0.	0.	83.	7223.	2644.	163351.
2	3	0.	0.	357.	128033.	0.	0	80.	10080.	1111.	132938.
2	4	0.	0.	325.	114332.	0.	0.	120.	15353.	810.	73807.
2	5	0.	0.	287.	105670.	0.	0.	117.	18167.	262.	44397.
2	6	0.	0.	321.	88045.	0.	0.	120.	24899.	5.	207.
2	7	0.	0.	314.	99723.	0.	0.	120.	30232.	5.	214.
2	8	0.	0.	313.	93979.	0.	0.	120.	25731.	5.	217.
2	9	0.	0.	318.	81811.	0.	0.	120.	18870.	14.	323.
2	10	0.	0.	289.	109218.	0.	0.	93.	14917.	315.	57307.
2	11	0.	0.	407.	127872.	0.	0.	94.	7727.	1392.	143756.
2	12	0.	0.	481.	157313.	0.	0.	77.	6060.	3194.	215774.
ANNUAL VALUES FOR ALL SYSTEMS (NOT INCLUDED ON OUTPUT FILE FOR MOC)											
1	ANN	0.	0.	483.	1360446.	0.	0.	120.	105304.	2532.	1802358.
2	ANN	0.	0.	483.	1491514.	0.	0.	120.	105905.	3974.	1049670.

TABLE 11-176

ONLY SYSTEM NO. 1 APPLIES

ENERGY USAGE BY SOURCE

CONVENTIONAL HEATING AND COOLING

SYS	MO	GAS ENGINES MCF	GAS BOILER MCF	GAS PROCESS MCF	ELECTRIC BASE KWH	ELECTRIC ACC KWH	ELECTRIC HEATING KWH	ELECTRIC COOLING KWH	ELECTRIC PROCESS KWH
SYSTEM 1	RECIP CHILLER WITH ELEC BOILER								
1	1	0.	0.	0.	57611.	2567.	101884.	0.	419.
1	2	0.	0.	0.	52594.	2318.	80491.	0.	382.
1	3	0.	0.	0.	54390.	2879.	68917.	272.	385.
1	4	0.	0.	0.	58928.	3379.	42486.	3377.	419.
1	5	0.	0.	0.	59363.	4265.	27046.	5928.	419.
1	6	0.	0.	0.	56876.	3679.	1347.	20215.	385.
1	7	0.	0.	0.	62793.	4126.	1384.	26337.	419.
1	8	0.	0.	0.	61137.	3921.	1391.	21913.	422.
1	9	0.	0.	0.	57553.	2995.	1405.	12696.	401.
1	10	0.	0.	0.	62409.	3663.	33257.	4473.	438.
1	11	0.	0.	0.	53492.	2827.	68989.	783.	385.
1	12	0.	0.	0.	55230.	2688.	99620.	46.	401.
1	ANN	0.	0.	0.	692376.	39507.	528216.	95761.	4875.
SYSTEM 2	CALIFORNIA HEAT PUMP SYSTEM								
2	1	0.	0.	0.	55376.	6562.	89407.	8253.	419.
2	2	0.	0.	0.	51335.	5924.	68174.	9200.	382.
2	3	0.	0.	0.	52160.	6600.	56337.	12559.	385.
2	4	0.	0.	0.	56206.	6246.	32340.	19129.	419.
2	5	0.	0.	0.	56376.	6418.	19826.	22635.	419.
2	6	0.	0.	0.	51990.	4251.	403.	31023.	385.
2	7	0.	0.	0.	56376.	4854.	412.	37667.	419.
2	8	0.	0.	0.	56691.	4397.	414.	32060.	422.
2	9	0.	0.	0.	53941.	3514.	449.	23511.	401.
2	10	0.	0.	0.	58642.	6391.	25179.	18585.	438.
2	11	0.	0.	0.	51990.	6347.	59530.	9627.	385.
2	12	0.	0.	0.	54111.	6565.	88365.	7575.	401.
2	ANN	0.	0.	0.	656195.	68060.	440833.	231622.	4875.

TABLE 11-177

ONLY SYSTEM NO. 1 APPLIES

ELECTRICAL ENERGY FACTOR	0.3330
GASEOUS ENERGY FACTOR	0.9500
BTUS PER CUBIC FOOT GAS	1020.0

BTU COUNT FOR SYSTEM NO. 1 RECIP CHILLER WITH ELEC BOILER

BTUS GAS CONSUMED AT SITE	0. MMBTU
BTUS ELECTRIC CONSUMED AT SITE	4643. MMBTU
TOTAL BTUS CONSUMED AT SITE	4643. MMBTU
EQUIVALENT BTUS GAS AT WELL	0. MMBTU
EQUIVALENT BTUS ELECTRIC AT POWER STATION	13944. MMBTU
TOTAL EQUIVALENT BTUS IN RAW ENERGY FORM	13944. MMBTU

BTU COUNT FOR SYSTEM NO. 2 CALIFORNIA HEAT PUMP

BTUS GAS CONSUMED AT SITE	0. MMBTU
BTUS ELECTRIC CONSUMED AT SITE	4783. MMBTU
TOTAL BTUS CONSUMED AT SITE	4783. MMBTU
EQUIVALENT BTUS GAS AT WELL	0. MMBTU
EQUIVALENT BTUS ELECTRIC AT POWER STATION	14364. MMBTU
TOTAL EQUIVALENT BTUS IN RAW ENERGY FORM	14364. MMBTU

BTU COUNT FOR SYSTEM NO. 3 DOUBLE CONDENSER

BTUS GAS CONSUMED AT SITE	0. MMBTU
BTUS ELECTRIC CONSUMED AT SITE	4419. MMBTU
TOTAL BTUS CONSUMED AT SITE	4419. MMBTU
EQUIVALENT BTUS GAS AT WELL	0. MMBTU
EQUIVALENT BTUS ELECTRIC AT POWER STATION	13270. MMBTU
TOTAL EQUIVALENT BTUS IN RAW ENERGY FORM	13270. MMBTU

BTU COUNT FOR SYSTEM NO. 4 MECH GAS HEAT PUMP

BTUS GAS CONSUMED AT SITE	6151. MMBTU
BTUS ELECTRIC CONSUMED AT SITE	1850. MMBTU
TOTAL BTUS CONSUMED AT SITE	8001. MMBTU
EQUIVALENT BTUS GAS AT WELL	6475. MMBTU
EQUIVALENT BTUS ELECTRIC AT POWER STATION	5555. MMBTU
TOTAL EQUIVALENT BTUS IN RAW ENERGY FORM	12030. MMBTU

BTU COUNT FOR SYSTEM NO. 5 ELEC GAS HEAT PUMP

BTUS GAS CONSUMED AT SITE	6124. MMBTU
BTUS ELECTRIC CONSUMED AT SITE	1696. MMBTU
TOTAL BTUS CONSUMED AT SITE	7820. MMBTU
EQUIVALENT BTUS GAS AT WELL	6447. MMBTU
EQUIVALENT BTUS ELECTRIC AT POWER STATION	[illegible] MMBTU

TABLE 11-178

ONLY SYSTEM A-1 APPLIES

MONTHLY AND ANNUAL UTILITY COST FOR

CLEVELAND RATES PRESENT

NO SYSTEM/RATE COMBINATIONS	5
INPUT KEY	1
NO SYSTEMS ON FILE/CARDS	5
GROUP KEY	0
NO REPLACEMENT/ADDIT CARDS	0
NO GAS RATES	1
NO ELECTRIC RATES	2
NO AUXILIARY FUEL RATES	0
NO CHILLED WATER RATES	0
NO STEAM OR HOT WATER RATES	0
FLOOR AREA, SQFT	0.

GAS RATE C1

	MA $	FC $	FAK	MBA	MDACF	MPCT	MONTHS	AV MO	PAP	RFPG	APPL	
MO	4.	0.	32.10	0.0	0.	0. 0	0 0 0 0	0 0	0.	0.0	0	EOG GEN SERVICE PUCO 500
DR	0.	0.0	0.	0.0		0.	0.0	0.	0.0	0.	0.0	0. 0.0 0. 0.0
CR	1. 0	413.0	4. 0	218.0		1. 0	205.0	0. 0	0.0	0. 0	0.0	0. 0 0.0 0. 0 0.0

ELECTRIC RATE 2S

	$	$/KW	KH/KW	PD	FAK	MBA	MDKW	MPCT	MONTHS	AV MO	PPD	CDC	C/KWH	SB	
MO	10.	0.0	0.	0	1.61	0.0	0.	0.	0 0 0 0 0	0 0	0.	0.	0.0	0	LARGE COMM. 30 KW OR MORE
DR		50.	3.76		1.	2.70		0.	0.0	0.	0.0		0.	0.0	0. 0.0 0. 0.0
CR	40000.		2.39	60000.		1.88	1.		1.28	0.	0.0	0.		0.0	0. 0.0 0. 0.0

ELECTRIC RATE 2W

	$	$/KW	KH/KW	PD	FAK	MBA	MDKW	MPCT	MONTHS	AV MO	PPD	CDC	C/KWH	SB	
MO	10.	0.0	0.	0	1.61	0.0	0.	0.	0 0 0 0 0	0 0	0.	0.	0.0	0	LARGE COMM. 30 KW OR MORE
DR		50.	3.61		1.	2.55		0.	0.0	0.	0.0		0.	0.0	0. 0.0 0. 0.0
CR	40000.		2.14	60000.		1.63	1.		1.18	0.	0.0	0.		0.0	0. 0.0 0. 0.0

SYSTEM/RATE SCHEDULE MATCHING		GAS RATES RT	MO-MO	RT	ELEC RATES RT	MO-MO	RT	AF RATES RT	MO-MO	RT	CW RATES RT	MO-MO	RT	STM RATES RT	MO-MO	RT	PCDI	C/KVA	KWHED
A1	RECIP CHILLER GAS BOILER	C1	1	12	2S	6	9 2W	0	0		0	0		0	0		0.0	0.0	0.
B1	CALIFORNIA HEAT PUMP		0	0	2S	6	9 2W	0	0		0	0		0	0		0.0	0.0	0.
C1	DOUBLE CONDENSER		0	0	2S	6	9 2W	0	0		0	0		0	0		0.0	0.0	0.
D1	MECH GAS HEAT PUMP	C1	1	12	2S	6	9 2W	0	0		0	0		0	0		0.0	0.0	0.
E1	ELEC GAS HEAT PUMP	C1	1	12	2S	6	9 2W	0	0		0	0		0	0		0.0	0.0	0.

TABLE 11-179

ONLY SYSTEM A-1 APPLIES

MONTHLY DEMAND AND CONSUMPTION VALUES

	GDEM	GCON	FDEM	ECON	ACON	AHRS	CDEM	CCON	HDEM	HCON
A1 1	1.	453.	172.	60597.	0.	0.	0.	0.	0.	0.
A1 2	1.	368.	175.	55294.	0.	0.	0.	0.	0.	0.
A1 3	1.	334.	217.	57926.	0.	0.	0.	0.	0.	0.
A1 4	1.	226.	249.	66103.	0.	0.	0.	0.	0.	0.
A1 5	0.	167.	274.	69974.	0.	0.	0.	0.	0.	0.
A1 6	0.	11.	323.	81152.	0.	0.	0.	0.	0.	0.
A1 7	0.	11.	322.	93371.	0.	0.	0.	0.	0.	0.
A1 8	0.	11.	305.	87388.	0.	0.	0.	0.	0.	0.
A1 9	0.	11.	315.	73641.	0.	0.	0.	0.	0.	0.
A1 10	1.	192.	277.	70931.	0.	0.	0.	0.	0.	0.
A1 11	1.	330.	220.	57488.	0.	0.	0.	0.	0.	0.
A1 12	1.	444.	193.	58254.	0.	0.	0.	0.	0.	0.
B1 1	0.	0.	442.	161312.	0.	0.	0.	0.	0.	0.
B1 2	0.	0.	483.	134807.	0.	0.	0.	0.	0.	0.
B1 3	0.	0.	357.	128033.	0.	0.	0.	0.	0.	0.
B1 4	0.	0.	325.	114332.	0.	0.	0.	0.	0.	0.
B1 5	0.	0.	287.	105672.	0.	0.	0.	0.	0.	0.
B1 6	0.	0.	321.	88045.	0.	0.	0.	0.	0.	0.
B1 7	0.	0.	319.	95723.	0.	0.	0.	0.	0.	0.
B1 8	0.	0.	313.	93479.	0.	0.	0.	0.	0.	0.
B1 9	0.	0.	319.	81311.	0.	0.	0.	0.	0.	0.
B1 10	0.	0.	289.	109218.	0.	0.	0.	0.	0.	0.
B1 11	0.	0.	407.	127872.	0.	0.	0.	0.	0.	0.
B1 12	0.	0.	481.	156766.	0.	0.	0.	0.	0.	0.
C1 1	0.	0.	519.	146739.	0.	0.	0.	0.	0.	0.
C1 2	0.	0.	520.	121310.	0.	0.	0.	0.	0.	0.
C1 3	0.	0.	379.	111386.	0.	0.	0.	0.	0.	0.
C1 4	0.	0.	361.	100331.	0.	0.	0.	0.	0.	0.
C1 5	0.	0.	349.	97424.	0.	0.	0.	0.	0.	0.
C1 6	0.	0.	331.	86024.	0.	0.	0.	0.	0.	0.
C1 7	0.	0.	332.	97851.	0.	0.	0.	0.	0.	0.
C1 8	0.	0.	312.	91037.	0.	0.	0.	0.	0.	0.
C1 9	0.	0.	322.	80033.	0.	0.	0.	0.	0.	0.
C1 10	0.	0.	314.	100676.	0.	0.	0.	0.	0.	0.
C1 11	0.	0.	444.	114743.	0.	0.	0.	0.	0.	0.
C1 12	0.	0.	477.	146592.	0.	0.	0.	0.	0.	0.
D1 1	2.	677.	138.	33742.	0.	0.	0.	0.	0.	0.
D1 2	2.	596.	139.	31563.	0.	0.	0.	0.	0.	0.
D1 3	2.	612.	154.	32098.	0.	0.	0.	0.	0.	0.
D1 4	1.	577.	178.	40142.	0.	0.	0.	0.	0.	0.
D1 5	1.	576.	201.	42456.	0.	0.	0.	0.	0.	0.
D1 6	1.	271.	262.	61258.	0.	0.	0.	0.	0.	0.
D1 7	1.	289.	256.	71494.	0.	0.	0.	0.	0.	0.
D1 8	1.	294.	241.	65403.	0.	0.	0.	0.	0.	0.
D1 9	1.	246.	250.	55949.	0.	0.	0.	0.	0.	0.
D1 10	1.	585.	207.	44289.	0.	0.	0.	0.	0.	0.
D1 11	2.	619.	156.	32092.	0.	0.	0.	0.	0.	0.
D1 12	2.	668.	138.	31563.	0.	0.	0.	0.	0.	0.
E1 1	2.	677.	132.	29715.	0.	0.	0.	0.	0.	0.
E1 2	2.	596.	131.	26389.	0.	0.	0.	0.	0.	0.
E1 3	2.	612.	159.	26428.	0.	0.	0.	0.	0.	0.
E1 4	1.	575.	178.	35190.	0.	0.	0.	0.	0.	0.
E1 5	1.	574.	201.	37756.	0.	0.	0.	0.	0.	0.
E1 6	1.	265.	261.	60524.	0.	0.	0.	0.	0.	0.
E1 7	1.	284.	256.	70436.	0.	0.	0.	0.	0.	0.
E1 8	1.	289.	241.	64918.	0.	0.	0.	0.	0.	0.
E1 9	1.	241.	250.	54862.	0.	0.	0.	0.	0.	0.
E1 10	1.	583.	207.	39383.	0.	0.	0.	0.	0.	0.
E1 11	2.	619.	154.	26604.	0.	0.	0.	0.	0.	0.
E1 12	2.	668.	132.	25353.	0.	0.	0.	0.	0.	0.

TABLE 11-180

ONLY SYSTEM A-1 APPLIES

MONTHLY AND ANNUAL UTILITY COST FOR

CLEVELAND RATES PRESENT

	ELECTRIC COST, $	AVER RATE C/KWH	UNIT COST C/SQFT	GAS COST, $	AVER RATE C/MCF	UNIT COST C/SQFT
SYSTEM A1	RECIP CHILLER GAS BOILER					
JAN	2661.	4.391	0.0	1077.	237.57	0.0
FEB	2496.	4.515	0.0	875.	237.81	0.0
MAR	2589.	4.542	0.0	792.	237.88	0.0
APR	3036.	4.592	0.0	538.	238.25	0.0
MAY	3225.	4.609	0.0	399.	238.66	0.0
JUN	3964.	4.484	0.0	29.	260.74	0.0
JUL	4384.	4.699	0.0	29.	260.74	0.0
AUG	4133.	4.729	0.0	29.	260.74	0.0
SEP	3658.	4.997	0.0	29.	260.74	0.0
OCT	3265.	4.600	0.0	458.	238.45	0.0
NOV	2682.	4.606	0.0	785.	237.89	0.0
DEC	2638.	4.529	0.0	1055.	237.69	0.0
ANN	38857.	4.669	0.0	6094.	238.32	0.0
SYSTEM B1	CALIFORNIA HEAT PUMP					
JAN	6321.	3.432	0.0			
FEB	5704.	4.231	0.0			
MAR	5193.	4.056	0.0			
APR	5729.	4.136	0.0			
MAY	5293.	4.155	0.0			
JUN	5199.	4.769	0.0			
JUL	6072.	4.014	0.0			
AUG	5185.	4.066	0.0			
SEP	3973.	4.357	0.0			
OCT	4494.	4.115	0.0			
NOV	5316.	4.158	0.0			
DEC	6312.	4.326	0.0			
ANN	59629.	4.255	0.0			
SYSTEM C1	DOUBLE CONDENSER					
JAN	6129.	4.177	0.0			
FEB	5421.	4.465	0.0			
MAR	4784.	4.295	0.0			
APR	4444.	4.407	0.0			
MAY	4306.	4.420	0.0			
JUN	4156.	4.831	0.0			
JUL	4571.	4.672	0.0			
AUG	4279.	4.701	0.0			
SEP	3922.	4.980	0.0			
OCT	4318.	4.292	0.0			
NOV	5044.	4.396	0.0			
DEC	6018.	4.105	0.0			
ANN	57392.	4.433	0.0			

TABLE 11-181

ONLY SYSTEM A-1 APPLIES

MONTHLY AND ANNUAL UTILITY COST FOR

CLEVELAND RATES PRESENT

	ELECTRIC COST, $	AVER RATE C/KWH	UNIT COST C/SQFT	GAS COST, $	AVER RATE C/MCF	UNIT COST C/SQFT
SYSTEM D1 MECH GAS HEAT PUMP						
JAN	1671.	4.953	0.0	1608.	237.48	0.0
FEB	1592.	5.044	0.0	1416.	237.54	0.0
MAR	1650.	5.142	0.0	1501.	237.51	0.0
APR	2713.	5.014	0.0	1371.	237.55	0.0
MAY	2146.	5.356	0.0	1364.	237.55	0.0
JUN	3104.	5.067	0.0	649.	238.06	0.0
JUL	3442.	4.821	0.0	688.	238.03	0.0
AUG	3192.	4.881	0.0	700.	237.98	0.0
SEP	2686.	5.159	0.0	586.	238.16	0.0
OCT	2221.	5.015	0.0	1397.	237.54	0.0
NOV	1655.	5.158	0.0	1473.	237.52	0.0
DEC	1589.	5.036	0.0	1586.	237.49	0.0
ANN	27164.	5.012	0.0	14328.	237.62	0.0
SYSTEM E1 ELEC GAS HEAT PUMP						
JAN	1436.	5.125	0.0	1608.	237.48	0.0
FEB	1377.	5.220	0.0	1416.	237.54	0.0
MAR	1425.	5.391	0.0	1501.	237.51	0.0
APR	1428.	5.193	0.0	1366.	237.55	0.0
MAY	1983.	5.251	0.0	1364.	237.55	0.0
JUN	3076.	5.082	0.0	681.	238.09	0.0
JUL	3428.	4.829	0.0	676.	238.02	0.0
AUG	3172.	4.893	0.0	688.	238.00	0.0
SEP	2348.	5.192	0.0	574.	238.18	0.0
OCT	2059.	5.228	0.0	1385.	237.55	0.0
NOV	1446.	5.425	0.0	1473.	237.52	0.0
DEC	1363.	5.260	0.0	1586.	237.49	0.0
ANN	25437.	5.119	0.0	14264.	237.62	0.0

TOTAL UTILITY COST

NO	NAME	$
A1	RECIP CHILLER GAS BOILER	44951.
B1	CALIFORNIA HEAT PUMP	59629.
C1	DOUBLE CONDENSER	57392.
D1	MECH GAS HEAT PUMP	41692.
E1	ELEC GAS HEAT PUMP	39701.

TABLE 11-182

ONLY SYSTEMS A-1 & C-1 APPLY

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MONTHLY AND ANNUAL UTILITY COST FOR

 CLEVELAND RATES  PRESENT

    NO SYSTEM/RATE COMBINATIONS     5
    INPUT KEY                       1
    NO SYSTEMS ON FILE/CARDS        5
    GROUP KEY                       0
    NO REPLACEMENT/ADDIT CARDS      0
    NO GAS RATES                    1
    NO ELECTRIC RATES               2
    NO AUXILIARY FUEL RATES         0
    NO CHILLED WATER RATES          0
    NO STEAM OR HOT WATER RATES     0
    FLOOR AREA, SQFT                0.

GAS RATE G1
    MN $        FC $        FAR    NBA MOMCF MPCT MONTHS        AV MO   PAP  RFPG APPL
MO    4.          0.      32.10   0.0     0.   0.  0  0   0  0  0  0   0.   0.0    0                EOG GEN SERVICE PUCO  500
DR        0.     0.0          0.   0.0         0.    0.0          0.    0.0         0.    0.0          0.    0.0
CR      1.  0  413.0       4.  0  213.0      1.  0  205.0      0.  0   0.0      0.  0   0.0      0.  0   0.0      0.  0   0.0

ELECTRIC RATE 2S
        $  $/KW KH/KW PD     FAR    NBA   MOKW MPCT MONTHS        AV MO   PPD   CDC C/KWH  SB
MO   10.  0.0     0.  0    1.61   0.0     0.   0.  0  0   0  0  0  0   0.   0.   0.0    0                LARGE COMM. 30 KW OR MORE
DR        50.   3.76          1.   2.70         0.    0.0          0.    0.0         0.    0.0          0.    0.0
CR   40000.     2.39  60000.      1.88      1.      1.28      0.      0.0      0.      0.0      0.      0.0      0.      0.0

ELECTRIC RATE 2W
        $  $/KW KH/KW PD     FAR    NBA   MOKW MPCT MONTHS        AV MO   PPD   CDC C/KWH  SB
MO   10.  0.0     0.  0    1.61   0.0     0.   0.  0  0   0  0  0  0   0.   0.   0.0    0                LARGE COMM. 30 KW OR MORE
DR        50.   3.61          1.   2.55         0.    0.0          0.    0.0         0.    0.0          0.    0.0
CR   40000.     2.14  60000.      1.63      1.      1.18      0.      0.0      0.      0.0      0.      0.0      0.      0.0

SYSTEM/RATE SCHEDULE MATCHING    GAS RATES      ELEC RATES     AF RATES       CW RATES       STM RATES      PCDI   C/KVA   KWRED
                                 RT MO-MO RT    RT MO-MO RT    RT MO-MO RT    RT MO-MO RT    RT MO-MO RT
A1   RECIP CHILLER ELE BOILER     0  0           2S  6  9 2W    0  0           0  0           0  0           0.0    0.0     0.
B1   CALIFORNIA HEAT PUMP         0  0           2S  6  9 2W    0  0           0  0           0  0           0.0    0.0     0.
C1   DOUBLE CONDENSER             0  0           2S  6  9 2W    0  0           0  0           0  0           0.0    0.0     0.
D1   MECH GAS HEAT PUMP           C1 1 12        2S  6  9 2W    0  0           0  0           0  0           0.0    0.0     0.
E1   ELEC GAS HEAT PUMP           C1 1 12        2S  6  9 2W    0  0           0  0           0  0           0.0    0.0     0.
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TABLE 11-183

ONLY SYSTEMS A-1 & C-1 APPLY

MONTHLY DEMAND AND CONSUMPTION VALUES

	GDEM	GCON	EDEM	ECON	ACON	AHRS	CDEM	CCON	HDEM	HCON
A1 1	0.	0.	483.	162475.	0.	0.	0.	0.	0.	0.
A1 2	0.	0.	483.	135779.	0.	0.	0.	0.	0.	0.
A1 3	0.	0.	350.	126836.	0.	0.	0.	0.	0.	0.
A1 4	0.	0.	317.	106590.	0.	0.	0.	0.	0.	0.
A1 5	0.	0.	280.	97315.	0.	0.	0.	0.	0.	0.
A1 6	0.	0.	330.	82459.	0.	0.	0.	0.	0.	0.
A1 7	0.	0.	331.	94754.	0.	0.	0.	0.	0.	0.
A1 8	0.	0.	310.	88779.	0.	0.	0.	0.	0.	0.
A1 9	0.	0.	320.	75046.	0.	0.	0.	0.	0.	0.
A1 10	0.	0.	282.	104234.	0.	0.	0.	0.	0.	0.
A1 11	0.	0.	447.	120470.	0.	0.	0.	0.	0.	0.
A1 12	0.	0.	482.	157742.	0.	0.	0.	0.	0.	0.
B1 1	0.	0.	442.	161012.	0.	0.	0.	0.	0.	0.
B1 2	0.	0.	483.	134807.	0.	0.	0.	0.	0.	0.
B1 3	0.	0.	357.	128033.	0.	0.	0.	0.	0.	0.
B1 4	0.	0.	325.	115332.	0.	0.	0.	0.	0.	0.
B1 5	0.	0.	287.	105673.	0.	0.	0.	0.	0.	0.
B1 6	0.	0.	321.	88045.	0.	0.	0.	0.	0.	0.
B1 7	0.	0.	319.	99723.	0.	0.	0.	0.	0.	0.
B1 8	0.	0.	313.	93979.	0.	0.	0.	0.	0.	0.
B1 9	0.	0.	318.	81811.	0.	0.	0.	0.	0.	0.
B1 10	0.	0.	269.	109218.	0.	0.	0.	0.	0.	0.
B1 11	0.	0.	407.	127872.	0.	0.	0.	0.	0.	0.
B1 12	0.	0.	481.	156766.	0.	0.	0.	0.	0.	0.
C1 1	0.	0.	519.	146739.	0.	0.	0.	0.	0.	0.
C1 2	0.	0.	520.	121310.	0.	0.	0.	0.	0.	0.
C1 3	0.	0.	379.	111386.	0.	0.	0.	0.	0.	0.
C1 4	0.	0.	361.	100831.	0.	0.	0.	0.	0.	0.
C1 5	0.	0.	349.	97424.	0.	0.	0.	0.	0.	0.
C1 6	0.	0.	331.	86024.	0.	0.	0.	0.	0.	0.
C1 7	0.	0.	332.	97851.	0.	0.	0.	0.	0.	0.
C1 8	0.	0.	312.	91037.	0.	0.	0.	0.	0.	0.
C1 9	0.	0.	322.	80033.	0.	0.	0.	0.	0.	0.
C1 10	0.	0.	314.	100666.	0.	0.	0.	0.	0.	0.
C1 11	0.	0.	444.	114743.	0.	0.	0.	0.	0.	0.
C1 12	0.	0.	477.	146592.	0.	0.	0.	0.	0.	0.
D1 1	2.	677.	138.	33742.	0.	0.	0.	0.	0.	0.
D1 2	2.	596.	134.	31563.	0.	0.	0.	0.	0.	0.
D1 3	2.	632.	154.	32098.	0.	0.	0.	0.	0.	0.
D1 4	1.	577.	176.	40142.	0.	0.	0.	0.	0.	0.
D1 5	1.	576.	201.	42456.	0.	0.	0.	0.	0.	0.
D1 6	1.	271.	242.	61258.	0.	0.	0.	0.	0.	0.
D1 7	1.	289.	256.	71404.	0.	0.	0.	0.	0.	0.
D1 8	1.	294.	241.	65405.	0.	0.	0.	0.	0.	0.
D1 9	1.	246.	250.	55969.	0.	0.	0.	0.	0.	0.
D1 10	1.	565.	207.	44289.	0.	0.	0.	0.	0.	0.
D1 11	2.	619.	156.	32092.	0.	0.	0.	0.	0.	0.
D1 12	2.	668.	136.	31563.	0.	0.	0.	0.	0.	0.
E1 1	2.	677.	130.	28315.	0.	0.	0.	0.	0.	0.
E1 2	2.	596.	131.	26389.	0.	0.	0.	0.	0.	0.
E1 3	2.	632.	149.	26428.	0.	0.	0.	0.	0.	0.
E1 4	1.	575.	178.	35190.	0.	0.	0.	0.	0.	0.
E1 5	1.	574.	201.	37756.	0.	0.	0.	0.	0.	0.
E1 6	1.	265.	261.	60524.	0.	0.	0.	0.	0.	0.
E1 7	1.	284.	256.	70986.	0.	0.	0.	0.	0.	0.
E1 8	1.	289.	241.	64818.	0.	0.	0.	0.	0.	0.
E1 9	1.	241.	250.	54862.	0.	0.	0.	0.	0.	0.
E1 10	1.	583.	207.	39383.	0.	0.	0.	0.	0.	0.
E1 11	2.	619.	154.	26664.	0.	0.	0.	0.	0.	0.
E1 12	2.	668.	132.	25853.	0.	0.	0.	0.	0.	0.

TABLE 11-184

ONLY SYSTEMS A-1 & C-1 APPLY

MONTHLY AND ANNUAL UTILITY COST FOR

CLEVELAND RATES PRESENT

	ELECTRIC COST, $	AVER RATE C/KWH	UNIT COST C/SQFT	GAS COST, $	AVER RATE C/MCF	UNIT COST C/SQFT
SYSTEM A1 B1 RECIP CHILLER ELE BOILER						
JAN	6477.	3.986	0.0			
FEB	5731.	4.221	0.0			
MAR	5244.	4.134	0.0			
APR	4548.	4.189	0.0			
MAY	4117.	4.244	0.0			
JUN	4030.	4.885	0.0			
JUL	4450.	4.707	0.0			
AUG	4195.	4.725	0.0			
SEP	3742.	4.987	0.0			
OCT	4337.	4.141	0.0			
NOV	5379.	4.253	0.0			
DEC	6342.	4.020	0.0			
ANN	58603.	4.308	0.0			
SYSTEM B1 CALIFORNIA HEAT PUMP						
JAN	6331.	3.932	0.0			
FEB	5704.	4.231	0.0			
MAR	5193.	4.056	0.0			
APR	4729.	4.136	0.0			
MAY	4390.	4.155	0.0			
JUN	4199.	4.769	0.0			
JUL	4602.	4.614	0.0			
AUG	4365.	4.666	0.0			
SEP	3973.	4.857	0.0			
OCT	4494.	4.115	0.0			
NOV	5316.	4.158	0.0			
DEC	6312.	4.026	0.0			
ANN	59629.	4.255	0.0			
SYSTEM C1 D2 DOUBLE CONDENSER						
JAN	6129.	4.177	0.0			
FEB	5421.	4.469	0.0			
MAR	4784.	4.295	0.0			
APR	4444.	4.407	0.0			
MAY	4306.	4.420	0.0			
JUN	4156.	4.831	0.0			
JUL	4571.	4.672	0.0			
AUG	4279.	4.721	0.0			
SEP	3922.	4.903	0.0			
OCT	4318.	4.292	0.0			
NOV	5244.	4.396	0.0			
DEC	6019.	4.195	0.0			
ANN	57992.	[illegible]	0.0			

TABLE 11-185

ONLY SYSTEMS A-1 & C-1 APPLY

MONTHLY AND ANNUAL UTILITY COST FOR

CLEVELAND RATES PRESENT

	ELECTRIC COST, $	AVER RATE C/KWH	UNIT COST C/SQFT	GAS COST, $	AVER RATE C/MCF	UNIT COST C/SQFT
SYSTEM D1	MECH GAS HEAT PUMP					
JAN	1671.	4.953	0.0	1608.	237.48	0.0
FEB	1592.	5.044	0.0	1416.	237.54	0.0
MAR	1650.	5.142	0.0	1501.	237.51	0.0
APR	2013.	5.014	0.0	1371.	237.55	0.0
MAY	2146.	5.056	0.0	1368.	237.55	0.0
JUN	3104.	5.067	0.0	645.	236.06	0.0
JUL	3442.	4.821	0.0	638.	238.00	0.0
AUG	3192.	4.881	0.0	700.	237.98	0.0
SEP	2686.	5.159	0.0	586.	238.16	0.0
OCT	2221.	5.015	0.0	1350.	237.54	0.0
NOV	1655.	5.158	0.0	1470.	237.52	0.0
DEC	1589.	5.036	0.0	1586.	237.49	0.0
ANN	27164.	5.012	0.0	14328.	237.62	0.0
SYSTEM E1	ELEC GAS HEAT PUMP					
JAN	1436.	5.125	0.0	1608.	237.48	0.0
FEB	1377.	5.220	0.0	1416.	237.54	0.0
MAR	1425.	5.391	0.0	1501.	237.51	0.0
APR	1828.	5.193	0.0	1366.	237.55	0.0
MAY	1983.	5.251	0.0	1364.	237.55	0.0
JUN	3076.	5.082	0.0	631.	238.08	0.0
JUL	3428.	4.829	0.0	676.	238.02	0.0
AUG	3172.	4.893	0.0	688.	238.00	0.0
SEP	2648.	5.192	0.0	574.	238.18	0.0
OCT	2059.	5.228	0.0	1365.	237.55	0.0
NOV	1446.	5.425	0.0	1470.	237.52	0.0
DEC	1350.	5.260	0.0	1586.	237.49	0.0
ANN	25437.	5.119	0.0	14264.	237.62	0.0

TOTAL UTILITY COST

NO	NAME	$
A1	RECIP CHILLER ELE BOILER	58603.
B1	CALIFORNIA HEAT PUMP	59629.
C1	DOUBLE CONDENSER	57392.
D1	MECH GAS HEAT PUMP	41492.
E1	ELEC GAS HEAT PUMP	39701.

TABLE 11-186

REVISED CASE NO. 12 (EXTENSION STUDY)

CATEGORY 2b: PRESENT RATES / CONSTANT WEATHER (CLE)

#8

INVESTMENT ANALYSIS

FOR OFFICE ELEC BOILER BLDG B-203

CONSIDERING THE FOLLOWING ALTERNATIVES

1 - SYSTEM
2 - SYSTEM
3 - SYSTEM

#8

TABLE 11-187

INVESTMENT ANALYSIS FOR OFFICE ELEC BOILER B1.16 B-283 DATE 8/20/79

* SUMMARY OF ASSUMPTIONS *

ALTERNATIVE - 1 - SYSTEM

STARTING DATE OF ANALYSIS - 1/ 1/85

LENGTH OF STUDY - 20 YEARS

	INV 1	INV 2	INV 3
YEAR OF INVESTMENT	1985	0	0
- FINANCING -			
DEBT	75.0	0.0	0.0
LEASED	0.0	0.0	0.0
TOTAL	75.0	0.0	0.0
COST OF DEBT	10.0	0.0	0.0
ANNUAL LEASING PMT-$/YR	0.	0.	0.
- DEPRECIATION -			
TOTAL INVESTMENT	232500.	0.	0.
LESS SALVAGE	0.	0.	0.
DEPRECIATION BASE	232500.	0.	0.
BOOK METHOD - STL			
BOOK LIFE	20 YRS	0 YRS	0 YRS
TAX METHOD -- DDB			
TAX LIFE	20 YRS	0 YRS	0 YRS

- TAXES AND INSURANCE -

PROPERTY TAX RATE -- 1.00 /YR ON NON-LEASED INVS

INSURANCE RATE -- 1.00 /YR ON INVESTMENT

FEDERAL INCOME TAX RATE -- 46.00

STATE/LOCAL INCOME TAX RATE -- 0.0

- INFLATION RATES -

PROPERTY TAX -- 0.0

FEDERAL TAX -- 0.0

STATE/LOCAL -- 0.0

LABOR -- 0.0 NATURAL GAS -- 0.0

MAINTENANCE -- 0.0 COAL -- 0.0

ELECTRICITY -- 0.0 OIL -- 0.0

- STARTING COST FIGURES - DOLLARS/YEAR

YEAR OF DATA 1985

LABOR	--	0.
MAINTENANCE	--	6500.
MISC EXPENSE	--	0.

FUELS- NATURAL GAS -- 0.
COAL -- 0.
OIL -- 0.
ELECTRICITY -- 58603.

TABLE 11-188

INVESTMENT ANALYSIS FOR OFFICE ELEC BOILER B1.16 B-283 DATE 8/20/79

* SUMMARY OF ASSUMPTIONS *

ALTERNATIVE - 2 - SYSTEM

STARTING DATE OF ANALYSIS - 1/ 1/85

LENGTH OF STUDY - 20 YEARS

	INV 1	INV 2	INV 3
YEAR OF INVESTMENT	1985	0	0
- FINANCING -			
DEBT	75.0	0.0	0.0
LEASED	0.0	0.0	0.0
TOTAL	75.0	0.0	0.0
COST OF DEBT	10.0	0.0	0.0
ANNUAL LEASING PMT-$/YR	0.	0.	0.
- DEPRECIATION -			
TOTAL INVESTMENT	235065.	0.	0.
LESS SALVAGE	0.	0.	0.
DEPRECIATION BASE	235065.	0.	0.
BOOK METHOD - SYL			
BOOK LIFE	20 YRS	0 YRS	0 YRS
TAX METHOD -- DDB			
TAX LIFE	20 YRS	0 YRS	0 YRS

- TAXES AND INSURANCE -

PROPERTY TAX RATE -- 1.00 /YR ON NON-LEASED INVS

INSURANCE RATE -- 1.00 /YR ON INVESTMENT

FEDERAL INCOME TAX RATE -- 46.00

STATE/LOCAL INCOME TAX RATE -- 0.0

- INFLATION RATES -

PROPERTY TAX -- 0.0

FEDERAL TAX -- 0.0

STATE/LOCAL -- 0.0

LABOR -- 0.0 NATURAL GAS -- 0.0

MAINTENANCE -- 0.0 COAL -- 0.0

ELECTRICITY -- 0.0 OIL -- 0.0

- STARTING COST FIGURES - DOLLARS/YEAR

YEAR OF DATA 1985

LABOR	--	0.
MAINTENANCE	--	6500.
MISC EXPENSE	--	0.

FUELS- NATURAL GAS -- 6094.

COAL	--	0.
OIL	--	0.
ELECTRICITY	--	38857.

TABLE 11-189

INVESTMENT ANALYSIS FOR OFFICE ELEC BOILER 81.16 B-283 DATE 8/20/79

* SUMMARY OF ASSUMPTIONS *

ALTERNATIVE - 3 - SYSTEM

STARTING DATE OF ANALYSIS - 1/ 1/85

LENGTH OF STUDY - 20 YEARS

	INV 1	INV 2	INV 3
YEAR OF INVESTMENT	1985	0	0
- FINANCING -			
DEBT	75.0	0.0	0.0
LEASED	0.0	0.0	0.0
TOTAL	75.0	0.0	0.0
COST OF DEBT	10.0	0.0	0.0
ANNUAL LEASING PMT-$/YR	0.	0.	0.
- DEPRECIATION -			
TOTAL INVESTMENT	315500.	0.	0.
LESS SALVAGE	0.	0.	0.
DEPRECIATION BASE	315500.	0.	0.
BOOK METHOD - STL			
BOOK LIFE	20 YRS	0 YRS	0 YRS
TAX METHOD -- DDB			
TAX LIFE	20 YRS	0 YRS	0 YRS

- TAXES AND INSURANCE -

PROPERTY TAX RATE -- 1.00 /YR ON NON-LEASED INVS

INSURANCE RATE -- 1.00 /YR ON INVESTMENT

FEDERAL INCOME TAX RATE -- 46.00

STATE/LOCAL INCOME TAX RATE -- 0.0

- INFLATION RATES -

PROPERTY TAX -- 0.0

FEDERAL TAX -- 0.0

STATE/LOCAL -- 0.0

LABOR -- 0.0 NATURAL GAS -- 0.0

MAINTENANCE -- 0.0 COAL -- 0.0

ELECTRICITY -- 0.0 OIL -- 0.0

- STARTING COST FIGURES - DOLLARS/YEAR

YEAR OF DATA			
1985	LABOR --	0.	
	MAINTENANCE --	7300.	
	MISC EXPENSE --	0.	

FUELS- NATURAL GAS -- 0.
COAL -- 0.
OIL -- 0.
ELECTRICITY -- 57392.

INVESTMENT ANALYSIS FOR OFFICE FUEL BOILER BLDG B-283 DATE 8/20/79

ALTERNATIVE - 1 - SYSTEM

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
- INVESTMENT -										
CAPITAL REQUIRED	232500	0	0	0	0	0	0	0	0	0
SALVAGE VALUE	0	0	0	0	0	0	0	0	0	0
DEPRECIABLE AMOUNT	232500	0	0	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	3050	3355	3690	4059	4465	4912	5403	5943	6538	7191
OUTSTANDING CAPITAL	171625	168270	164580	160521	156056	151144	145741	139797	133260	126068
- BOOK EXPENSES -										
BOOK DEPRECIATION	11645	11645	11645	11645	11645	11645	11645	11645	11645	11645
DEBT INTEREST	17467	17163	16827	16458	16052	15606	15114	14574	13980	13326
STATE/LOCAL PROP. TAXES	2329	2329	2329	2329	2329	2329	2329	2329	2329	2329
INSURANCE	2329	2329	2329	2329	2329	2329	2329	2329	2329	2329
SUB TOTAL	33770	33466	33130	32761	32355	31909	31417	30877	30283	29629
MAINTENANCE	6500	6500	6500	6500	6500	6500	6500	6500	6500	6500
ELECTRICAL POWER	58603	58603	58603	58603	58603	58603	58603	58603	58603	58603
TOTAL BOOK EXPENSES	98873	98569	98233	97864	97458	97012	96520	95980	95386	94732
NET BOOK EXPENSES	98873	98569	98233	97864	97458	97012	96520	95980	95386	94732
NET CASH FLOW OUT	57665	40651	41770	42807	43775	44684	45542	46360	47146	47908
PW FACTOR AT 15.0	0.8696	0.7561	0.6575	0.5718	0.4972	0.4323	0.3759	0.3269	0.2843	0.2472
PW OF NET CASH FLOW OUT	64926	30738	27464	24475	21764	19318	17121	15155	13402	11842

TABLE 11-190

TABLE 11-191

INVESTMENT ANALYSIS FOR OFFICE ELEC BOILER B1-16 B-283 DATE 8/20/79

ALTERNATIVE - 1 - SYSTEM

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
- INVESTMENT -										
CAPITAL REQUIRED	0	0	0	0	0	0	0	0	0	0
SALVAGE VALUE	0	0	0	0	0	0	0	0	0	0
DEPRECIABLE AMOUNT	0	0	0	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	7510	8702	9572	10529	11582	12740	14014	15415	16957	18652
OUTSTANDING CAPITAL	118158	109456	99885	89356	77774	65034	51020	35605	18648	-3
- BOOK EXPENSES -										
BOOK DEPRECIATION	11645	11645	11645	11645	11645	11645	11645	11645	11645	11645
DEBT INTEREST	12067	11816	10946	9988	8936	7777	6503	5102	3560	1865
STATE/LOCAL PROP. TAXES	2329	2329	2329	2329	2329	2329	2329	2329	2329	2329
INSURANCE	2329	2329	2329	2329	2329	2329	2329	2329	2329	2329
SUB TOTAL	28910	28119	27245	26291	25239	24080	22806	21405	19863	18168
MAINTENANCE	6500	6500	6500	6500	6500	6500	6500	6500	6500	6500
ELECTRICAL POWER	58603	58603	58603	58603	58603	58603	58603	58603	58603	58603
TOTAL BOOK EXPENSES	94013	93222	92352	91394	90342	89183	87909	86508	84966	83271
NET BOOK EXPENSES	94013	93222	92352	91394	90342	89183	87909	86508	84966	83271
NET CASH FLOW BCT	48654	49017	49418	49858	50342	50875	51461	52106	52815	53595
PW FACTOR AT 15.0	0.2149	0.1969	0.1625	0.1413	0.1229	0.1069	0.0929	0.0808	0.0703	0.0611
PW OF NET CASH FLOW BCT	10458	9162	8032	7046	6187	5437	4782	4210	3711	3275
TOTAL PRESENT WORTH OF NET CASH FLOW BCT	328506									

TABLE 11-192

INVESTMENT ANALYSIS FOR EFFICIENT EFFC BOILER B1.1E B-283 DATE 8/20/79

ALTERNATIVE - 2 - SYSTEM

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
- INVESTMENT -										
CAPITAL REQUIRED	235065	0	0	0	0	0	0	0	0	0
SALVAGE VALUE	0	0	0	0	0	0	0	0	0	0
DEPRECIABLE AMOUNT	235065	0	0	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	3078	3386	3725	4097	4507	4957	5453	5998	6598	7258
OUTSTANDING CAPITAL	173261	169835	166110	162013	157506	152549	147096	141097	134499	127240
- BOOK EXPENSES -										
BOOK DEPRECIATION	11753	11753	11753	11753	11753	11753	11753	11753	11753	11753
DEBT INTEREST	17620	17322	16983	16611	16201	15751	15255	14710	14110	13450
STATE/LOCAL PROP. TAXES	2351	2351	2351	2351	2351	2351	2351	2351	2351	2351
INSURANCE	2351	2351	2351	2351	2351	2351	2351	2351	2351	2351
SUB TOTAL	34074	33777	33438	33066	32656	32205	31709	31164	30564	29904
FUEL	6094	6094	6094	6094	6094	6094	6094	6094	6094	6094
MAINTENANCE	6500	6500	6500	6500	6500	6500	6500	6500	6500	6500
ELECTRICAL POWER	38857	38857	38857	38857	38857	38857	38857	38857	38857	38857
TOTAL BOOK EXPENSES	85525	85228	84889	84517	84107	83656	83160	82615	82015	81355
NET BOOK EXPENSES	85525	85228	84889	84517	84107	83656	83160	82615	82015	81355
NET CASH FLOW OUT	40874	33330	34459	35507	36483	37400	38267	39092	39885	40654
PW FACTOR AT 15.0	0.8696	0.7561	0.6575	0.5718	0.4972	0.4323	0.3759	0.3269	0.2843	0.2472
PW OF NET CASH FLOW OUT	35521	25203	22658	20301	18139	16169	14386	12779	11338	10049

TABLE 11-193

INVESTMENT ANALYSIS FOR OFFICE ELEC BOILER HI.IC P-203 DATE 8/20/79

ALTERNATIVE - 2 - SYSTEM

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
- INVESTMENT -										
CAPITAL REQUIRED	0	0	0	0	0	0	0	0	0	0
SALVAGE VALUE	0	0	0	0	0	0	0	0	0	0
DEPRECIABLE AMOUNT	0	0	0	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	7984	8782	9661	10627	11689	12858	14144	15559	17114	18826
OUTSTANDING CAPITAL	115256	110474	100813	90187	78497	65639	51495	35936	18822	-3
- BLDG EXPENSES -										
BOOK DEPRECIATION	11753	11753	11753	11753	11753	11753	11753	11753	11753	11753
DEBT INTEREST	12724	11926	11047	10081	9019	7850	6564	5149	3594	1882
STATE/LOCAL PROP. TAXES	2351	2351	2351	2351	2351	2351	2351	2351	2351	2351
INSURANCE	2351	2351	2351	2351	2351	2351	2351	2351	2351	2351
SUB TOTAL	29179	28380	27502	26536	25473	24304	23018	21604	20048	18337
FUEL	6094	6094	6094	6094	6094	6094	6094	6094	6094	6094
MAINTENANCE	6500	6500	6500	6500	6500	6500	6500	6500	6500	6500
ELECTRICAL POWER	38857	38857	38857	38857	38857	38857	38857	38857	38857	38857
TOTAL BLDG EXPENSES	80630	79831	78953	77987	76924	75755	74469	73055	71499	69788
NET BLDG EXPENSES	80630	79831	78953	77987	76924	75755	74469	73055	71499	69788
NET CASH FLOW OUT	41367	41774	42178	42623	43111	43649	44241	44891	45607	46394
PW FACTOR AT 15.0	0.2149	0.1869	0.1625	0.1413	0.1229	0.1069	0.0929	0.0808	0.0703	0.0611
PW OF NET CASH FLOW OUT	8900	7808	6855	6024	5298	4665	4111	3627	3205	2835
TOTAL PRESENT WORTH OF NET CASH FLOW OUT	283370									

TABLE 11-194

INVESTMENT ANALYSIS FOR LEPICE EIFC BOILER B1.1L B-203 DATE 8/20/79

ALTERNATIVE - 3 - SYSTEM

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
- INVESTMENT -										
CAPITAL REQUIRED	315500	0	0	0	0	0	0	0	0	0
SALVAGE VALUE	0	0	0	0	0	0	0	0	0	0
DEPRECIABLE AMOUNT	315500	0	0	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	4121	4545	4995	5499	6049	6654	7319	8051	8856	9742
OUTSTANDING CAPITAL	232454	227549	222950	217451	211402	204748	197429	189378	180522	170780
- BOOK EXPENSES -										
BOOK DEPRECIATION	15775	15775	15775	15775	15775	15775	15775	15775	15775	15775
DEBT INTEREST	23662	23249	22795	22295	21745	21140	20475	19743	18938	18052
STATE/LOCAL PROP. TAXES	3155	3155	3155	3155	3155	3155	3155	3155	3155	3155
INSURANCE	3155	3155	3155	3155	3155	3155	3155	3155	3155	3155
SUB TOTAL	45747	45334	44880	44380	43830	43225	42560	41828	41023	40137
MAINTENANCE	7300	7300	7300	7300	7300	7300	7300	7300	7300	7300
ELECTRICAL POWER	57392	57392	57392	57392	57392	57392	57392	57392	57392	57392
TOTAL BOOK EXPENSES	110439	110026	109572	109072	108522	107917	107252	106520	105715	104829
NET BOOK EXPENSES	110439	110026	109572	109072	108522	107917	107252	106520	105715	104829
NET CASH FLOW OUT	115612	42379	43894	45299	46610	47841	49004	50112	51176	52208
PW FACTOR AT 15.0	0.8696	0.7561	0.6575	0.5718	0.4972	0.4323	0.3759	0.3269	0.2843	0.2472
PW OF NET CASH FLOW OUT	100411	32044	28861	25900	23174	20683	18422	16382	14548	12905

TABLE 11-195

INVESTMENT ANALYSIS FOR CITICE FIEC PEILER DI.IC B-283 DATE 8/20/79

ALTERNATIVE - 3 - SYSTEM

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
- INVESTMENT -										
CAPITAL REQUIRED	0	0	0	0	0	0	0	0	0	0
SALVAGE VALUE	0	0	0	0	0	0	0	0	0	0
DEPRECIABLE AMOUNT	0	0	0	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	10716	11728	12966	14263	15689	17258	18984	20882	22971	25268
OUTSTANDING CAPITAL	166664	148276	135310	121047	105357	88099	69115	48233	25262	-5
- BOOK EXPENSES -										
BOOK DEPRECIATION	15775	15775	15775	15775	15775	15775	15775	15775	15775	15775
DEBT INTEREST	17078	16066	14828	13531	12105	10536	8810	6912	4823	2526
STATE/LOCAL PROP. TAXES	3155	3155	3155	3155	3155	3155	3155	3155	3155	3155
INSURANCE	3155	3155	3155	3155	3155	3155	3155	3155	3155	3155
SUB TOTAL	39163	38091	36913	35616	34190	32621	30895	28996	26908	24611
MAINTENANCE	7300	7300	7300	7300	7300	7300	7300	7300	7300	7300
ELECTRICAL POWER	57392	57392	57392	57392	57392	57392	57392	57392	57392	57392
TOTAL BOOK EXPENSES	103855	102783	101605	100308	98882	97313	95587	93688	91600	89303
NET BOOK EXPENSES	103855	102783	101605	100308	98882	97313	95587	93688	91600	89303
NET CASH FLOW OUT	53219	52712	54254	54850	55507	56228	57022	57895	58856	59913
PW FACTOR AT 15.0	0.2149	0.1869	0.1625	0.1413	0.1229	0.1069	0.0929	0.0808	0.0703	0.0611
PW OF NET CASH FLOW OUT	11435	10035	8818	7752	6822	6009	5299	4678	4136	3661
TOTAL PRESENT WORTH OF NET CASH FLOW OUT	355581									

TABLE 11-196

INVESTMENT ANALYSIS FOR OFFICE ELEC BOILER B1.1E B-2B3 DATE 8/20/79

ALTERNATIVE - 1 - SYSTEM

COMBINED LOAN SCHEDULE

YR	PRINCIPAL	DEBT REPAYMENT	INTEREST	PRINCIPAL PAYMENT
1	174675	20517	17467	3050
2	171625	20517	17163	3355
3	168270	20517	16827	3690
4	164580	20517	16458	4059
5	160521	20517	16052	4465
6	156056	20517	15606	4912
7	151144	20517	15114	5403
8	145741	20517	14574	5943
9	139797	20517	13980	6538
10	133260	20517	13326	7191
11	126068	20517	12607	7910
12	118158	20517	11816	8702
13	109456	20517	10946	9572
14	99885	20517	9988	10529
15	89356	20517	8935	11582
16	77774	20517	7777	12740
17	65034	20517	6503	14014
18	51020	20517	5102	15415
19	35605	20517	3560	16957
20	18648	20517	1865	18652
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0
30	0	0	0	0
TOT	2356666	410345	235667	174679

INDIVIDUAL DEPRECIATION SCHEDULES

YR	BOOK DEPRECIATION METHOD - STL			TAX DEPRECIATION METHOD - DDB		
	INVS 1	INVS 2	INVS 3	INVS 1	INVS 2	INVS 3
1	11645	0	0	23290	0	0
2	11645	0	0	20961	0	0
3	11645	0	0	18865	0	0
4	11645	0	0	16978	0	0
5	11645	0	0	15281	0	0
6	11645	0	0	13753	0	0
7	11645	0	0	12377	0	0
8	11645	0	0	11140	0	0
9	11645	0	0	10026	0	0
10	11645	0	0	9023	0	0
11	11645	0	0	8121	0	0
12	11645	0	0	8121	0	0
13	11645	0	0	8121	0	0
14	11645	0	0	8121	0	0
15	11645	0	0	8121	0	0
16	11645	0	0	8121	0	0
17	11645	0	0	8121	0	0
18	11645	0	0	8121	0	0
19	11645	0	0	8121	0	0
20	11645	0	0	8121	0	0
21	0	0	0	0	0	0
22	0	0	0	0	0	0
23	0	0	0	0	0	0
24	0	0	0	0	0	0
25	0	0	0	0	0	0
26	0	0	0	0	0	0
27	0	0	0	0	0	0
28	0	0	0	0	0	0
29	0	0	0	0	0	0
30	0	0	0	0	0	0
TOT	232900	0	0	232899	0	0

TABLE 11-197

INVESTMENT ANALYSIS FOR SERVICE STAT ROLLER BLDG B-289 DATE 8/20/79

ALTERNATIVE - 2 - SYSTEM

COMBINED LOAN SCHEDULE

YR	PRINCIPAL	DEBT REPAYMENT	INTEREST	PRINCIPAL PAYMENT
1	176255	20708	17630	3078
2	173221	20708	17322	3386
3	169835	20708	16983	3725
4	166110	20708	16611	4097
5	162013	20708	16201	4507
6	157506	20708	15751	4957
7	152549	20708	15255	5453
8	147096	20708	14710	5998
9	141098	20708	14110	6598
10	134455	20708	13450	7258
11	127240	20708	12724	7984
12	119256	20708	11926	8782
13	110474	20708	11047	9661
14	100813	20708	10081	10627
15	90187	20708	9019	11689
16	78497	20708	7850	12858
17	65639	20708	6564	14144
18	51495	20708	5149	15559
19	35936	20708	3594	17114
20	18822	20708	1882	18826
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0
30	0	0	0	0
TOT	2378576	414160	237858	176302

INDIVIDUAL DEPRECIATION SCHEDULES

YR	BOOK DEPRECIATION METHOD - STL			TAX DEPRECIATION METHOD - DDB		
	INVS 1	INVS 2	INVS 3	INVS 1	INVS 2	INVS 3
1	11753	0	0	23506	0	0
2	11753	0	0	21156	0	0
3	11753	0	0	19040	0	0
4	11753	0	0	17136	0	0
5	11753	0	0	15423	0	0
6	11753	0	0	13880	0	0
7	11753	0	0	12492	0	0
8	11753	0	0	11243	0	0
9	11753	0	0	10119	0	0
10	11753	0	0	9107	0	0
11	11753	0	0	8196	0	0
12	11753	0	0	8196	0	0
13	11753	0	0	8196	0	0
14	11753	0	0	8196	0	0
15	11753	0	0	8196	0	0
16	11753	0	0	8196	0	0
17	11753	0	0	8196	0	0
18	11753	0	0	8196	0	0
19	11753	0	0	8196	0	0
20	11753	0	0	8196	0	0
21	0	0	0	0	0	0
22	0	0	0	0	0	0
23	0	0	0	0	0	0
24	0	0	0	0	0	0
25	0	0	0	0	0	0
26	0	0	0	0	0	0
27	0	0	0	0	0	0
28	0	0	0	0	0	0
29	0	0	0	0	0	0
30	0	0	0	0	0	0
	235065	0	0	235064	0	0

TABLE 11-198

INVESTMENT ANALYSIS FOR FRIGE ELEC BILLER B1.16 R-283 DATE 8/20/79

ALTERNATIVE - 3 - SYSTEM

COMBINED LOAN SCHEDULE

YR	PRINCIPAL	DEBT REPAYMENT	INTEREST	PRINCIPAL PAYMENT
1	236625	27754	23662	4131
2	232494	27754	23249	4545
3	227949	27754	22795	4959
4	222990	27754	22299	5499
5	217451	27754	21745	6049
6	211402	27754	21140	6654
7	204748	27754	20475	7319
8	197429	27754	19743	8051
9	189378	27754	18938	8856
10	180522	27754	18052	9742
11	170780	27754	17078	10716
12	160064	27754	16006	11788
13	148276	27754	14828	12966
14	135310	27754	13531	14263
15	121047	27754	12105	15689
16	105357	27754	10536	17258
17	88099	27754	8810	18984
18	69115	27754	6912	20882
19	48233	27754	4823	22971
20	25262	27754	2526	25268
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0
30	0	0	0	0
TOT	3192475	555875	319248	236630

INDIVIDUAL DEPRECIATION SCHEDULES

YR	BOOK DEPRECIATION METHOD - STL			TAX DEPRECIATION METHOD - DDB		
	INVS 1	INVS 2	INVS 3	INVS 1	INVS 2	INVS 3
1	15775	0	0	31550	0	0
2	15775	0	0	28395	0	0
3	15775	0	0	25555	0	0
4	15775	0	0	23000	0	0
5	15775	0	0	20700	0	0
6	15775	0	0	18630	0	0
7	15775	0	0	16767	0	0
8	15775	0	0	15090	0	0
9	15775	0	0	13581	0	0
10	15775	0	0	12223	0	0
11	15775	0	0	11001	0	0
12	15775	0	0	11001	0	0
13	15775	0	0	11001	0	0
14	15775	0	0	11001	0	0
15	15775	0	0	11001	0	0
16	15775	0	0	11001	0	0
17	15775	0	0	11001	0	0
18	15775	0	0	11001	0	0
19	15775	0	0	11001	0	0
20	15775	0	0	11001	0	0
21	0	0	0	0	0	0
22	0	0	0	0	0	0
23	0	0	0	0	0	0
24	0	0	0	0	0	0
25	0	0	0	0	0	0
26	0	0	0	0	0	0
27	0	0	0	0	0	0
28	0	0	0	0	0	0
29	0	0	0	0	0	0
30	0	0	0	0	0	0
	315500	0	0	315499	0	0

TABLE 11-199

INVESTMENT ANALYSIS FOR OFFICE ELEC HEATER P1.16 8-202 DATE 8/20/79

ALTERNATIVE - 1 - SYSTEM

INCOME TAXES AND NET CASH FLOW CALCULATION

YR	A NET BOOK EXPENSES	B DEPRECIATION -BOOK-	C DEPRECIATION -TAX-	D STATE TAXABLE BASE D=A-B+C	E STATE INCOME TAX SAVINGS	F FEDERAL TAXABLE BASE F=D-E	G FEDERAL INCOME TAX SAVINGS	H AFTER TAX EXPENSES H=A-E-G	J EQUITY INVESTMENT & PRINCIPAL PAYMENTS	K NET CASH FLOW OUT K=H-B+J
1	96373	11645	23290	110518	0	110518	50838	48035	61275	97665
2	93509	11645	20961	107864	0	107864	49627	48942	3355	40651
3	98233	11645	18865	105453	0	105453	48508	49725	3690	41770
4	97864	11645	16978	103197	0	103197	47471	50393	4059	42807
5	97458	11645	15281	101094	0	101094	46503	50955	4465	43775
6	97012	11645	13753	99119	0	99119	45595	51417	4912	44684
7	96520	11645	12377	97253	0	97253	44736	51784	5403	45542
8	95980	11645	11140	95475	0	95475	43918	52062	5943	46160
9	95386	11645	10026	93766	0	93766	43132	52253	6538	47146
10	94732	11645	9023	92110	0	92110	42371	52361	7191	47908
11	94013	11645	8121	90489	0	90489	41625	52388	7910	48654
12	93222	11645	8121	89697	0	89697	41261	51961	8702	49017
13	92352	11645	8121	88827	0	88827	40861	51491	9572	49418
14	91394	11645	8121	87870	0	87870	40420	50974	10529	49858
15	90342	11645	8121	86817	0	86817	39936	50406	11582	50342
16	89183	11645	8121	85659	0	85659	39403	49780	12740	50875
17	87909	11645	8121	84385	0	84385	38817	49092	14014	51461
18	86508	11645	8121	82984	0	82984	38172	48336	15415	52106
19	84966	11645	8121	81442	0	81442	37463	47503	16957	52815
20	83271	11645	8121	79746	0	79746	36683	46587	18652	53595
TOT	1863782	232900	232900	1863783	0	1863783	857341	1006445	232903	1006448

K - THE REMAINING BOOK VALUE OR SALVAGE VALUE OF AN INVESTMENT IS SUBTRACTED FROM THE CASH FLOW AT ITS PRESENT WORTH VALUE AT THE TERMINATION OF THE STUDY

TABLE 11-200

INVESTMENT ANALYSIS FOR OFFICE BLDG PROBLEM #1-12 B-203 DATE 8/20/79

ALTERNATIVE - 2 - SYSTEM

INCOME TAXES AND NET CASH FLOW CALCULATION

	A	B	C	D	E	F	G	H	J	K
YR	NET BOOK EXPENSES	DEPRECIATION -BOOK-	DEPRECIATION -TAX-	STATE TAXABLE BASE D=A-B+C	STATE INCOME TAX SAVINGS	FEDERAL TAXABLE BASE F=D-E	FEDERAL INCOME TAX SAVINGS	AFTER TAX EXPENSES H=A-E-G	EQUITY INVESTMENT & PRINCIPAL PAYMENTS	NET CASH FLOW OUT K=H-B+J
1	85535	11753	23500	97289	0	97289	44753	40783	61844	90874
2	95228	11753	21156	94630	0	94630	43530	41658	3386	33330
3	84889	11753	19040	92176	0	92176	42401	42488	3725	34459
4	84517	11753	17136	89899	0	89899	41354	43163	4097	35507
5	84107	11753	15423	87776	0	87776	40377	43730	4507	36483
6	83656	11753	13880	85783	0	85783	39460	44196	4957	37400
7	83160	11753	12492	83899	0	83899	38594	44567	5453	38267
8	82615	11753	11243	82105	0	82105	37768	44847	5998	39392
9	82015	11753	10119	80381	0	80381	36975	45040	6598	39885
10	81355	11753	9107	78709	0	78709	36206	45149	7258	40654
11	80630	11753	8196	77073	0	77073	35453	45176	7984	41407
12	79831	11753	8196	76274	0	76274	35086	44745	8782	41774
13	78953	11753	8196	75396	0	75396	34682	44271	9661	42178
14	77987	11753	8196	74430	0	74430	34238	43745	10627	42623
15	76924	11753	8196	73367	0	73367	33749	43175	11689	43111
16	75755	11753	8196	72198	0	72198	33211	42544	12858	43649
17	74469	11753	8196	70912	0	70912	32620	41850	14144	44241
18	73055	11753	8196	69498	0	69498	31969	41086	15559	44891
19	71493	11753	8196	67942	0	67942	31253	40246	17114	45607
20	69788	11753	8196	66231	0	66231	30466	39322	18826	46394
TOT	1595565	235065	235065	1595564	0	1595564	734145	861823	235068	861827

K - THE REMAINING BOOK VALUE OR SALVAGE VALUE OF AN INVESTMENT IS SUBTRACTED FROM THE CASH FLOW AT ITS PRESENT WORTH VALUE AT THE TERMINATION OF THE STUDY

TABLE 11-201

INVESTMENT ANALYSIS FOR OFFICE FUEL PRIMER BLDG P-2R3 DATE 8/20/79

ALTERNATIVE - 3 - SYSTEM

INCOME TAXES AND NET CASH FLOW CALCULATION

	A	B	C	D	E	F	G	H	J	K
YR	NET BOOK EXPENSES	DEPRECIATION -BOOK-	DEPRECIATION -TAX-	STATE TAXABLE BASE D=A-B+C	STATE INCOME TAX SAVINGS	FEDERAL TAXABLE BASE F=D-E	FEDERAL INCOME TAX SAVINGS	AFTER TAX EXPENSES H=A-E-G	EQUITY INVESTMENT & PRINCIPAL PAYMENTS	NET CASH FLOW OUT K=H-B+J
1	110439	15775	31550	126214	0	126214	54059	52381	83006	119612
2	110026	15775	28355	122646	0	122646	56417	53609	4545	42379
3	109572	15775	25555	119352	0	119352	54902	54670	4555	43894
4	109072	15775	23000	116297	0	116297	53497	55575	5455	45299
5	108522	15775	20700	113447	0	113447	52186	56336	6045	46610
6	107917	15775	18630	110772	0	110772	50955	56962	6654	47841
7	107252	15775	16767	108244	0	108244	49792	57460	7319	49004
8	106520	15775	15090	105835	0	105835	48684	57836	8051	50112
9	105715	15775	13581	103521	0	103521	47620	58095	8856	51176
10	104829	15775	12223	101277	0	101277	46588	58242	9742	52208
11	103855	15775	11001	99081	0	99081	45577	58278	10716	53219
12	102783	15775	11001	98009	0	98009	45084	57699	11788	53712
13	101605	15775	11001	96830	0	96830	44542	57063	12966	54254
14	100308	15775	11001	95534	0	95534	43945	56362	14263	54850
15	98882	15775	11001	94107	0	94107	43289	55592	15689	55507
16	97313	15775	11001	92538	0	92538	42568	54745	17258	56228
17	95587	15775	11001	90813	0	90813	41774	53813	18984	57022
18	93689	15775	11001	88914	0	88914	40901	52788	20882	57895
19	91600	15775	11001	86826	0	86826	39940	51660	22971	58856
20	89303	15775	11001	84529	0	84529	38883	50420	25268	59913
TOT	2054782	315500	315500	2054782	0	2054782	945201	1109584	315505	1109589

K - THE REMAINING BOOK VALUE OR SALVAGE VALUE OF AN INVESTMENT IS SUBTRACTED FROM THE CASH FLOW AT ITS PRESENT WORTH VALUE AT THE TERMINATION OF THE STUDY

TABLE 11-202

OFFICE ELEC BOILER F1.16 8-283

BASE ALTERNATIVE .A. -SYSTEM — COMPARED TO ALTER. .B. -SYSTEM

GROSS INVESTMENT .A. 232500. — GROSS INVESTMENT .B. 235065.

TOTAL GROSS INVESTMENT DIFFERENCE -2165.

DISCOUNTED CASH FLOW

- RATE OF RETURN CALCULATION -

YEAR	* CASH FLOW TO DETERMINE RATE OF RETURN ALTER-A-	ALTER-B-	DIFFERENCE	PRESENT WORTH AT 338.0 FACTORS	AMOUNT	PRESENT WORTH AT 339.0 FACTORS	AMOUNT
1	26352.	25029.	7361.	0.2283	1631.	0.2279	1677.
2	37297.	25944.	7352.	0.0521	383.	0.0519	381.
3	38060.	30735.	7345.	0.0119	87.	0.0118	87.
4	38748.	31410.	7339.	0.0027	20.	0.0027	20.
5	39310.	31977.	7333.	0.0006	5.	0.0006	4.
6	39772.	32443.	7329.	0.0001	1.	0.0001	1.
7	40135.	32813.	7326.	0.0000	0.	0.0000	0.
8	40417.	33094.	7323.	0.0000	0.	0.0000	0.
9	40608.	33287.	7321.	0.0000	0.	0.0000	0.
10	40716.	33396.	7320.	0.0000	0.	0.0000	0.
11	40743.	33423.	7320.	0.0000	0.	0.0000	0.
12	40316.	32992.	7324.	0.0000	0.	0.0000	0.
13	39846.	32518.	7328.	0.0000	0.	0.0000	0.
14	39329.	31996.	7333.	0.0000	0.	0.0000	0.
15	38761.	31422.	7339.	0.0000	0.	0.0000	0.
16	38135.	30791.	7344.	0.0000	0.	0.0000	0.
17	37447.	30096.	7351.	0.0000	0.	0.0000	0.
18	36691.	29333.	7358.	0.0000	0.	0.0000	0.
19	35858.	28493.	7366.	0.0000	0.	0.0000	0.
20	34942.	27568.	7374.	0.0000	0.	0.0000	0.
TOTALS	773545.	626758.	146787.		2177.		2171.

THE EXACT DISCOUNTED CASH FLOW RATE OF RETURN ON GROSS INVESTMENT DIFFERENCE IS 338.28

* PRINCIPAL PAYMENTS AND EQUITY NOT INCLUDED IN CASH FLOW

TABLE 11-203

CNG TYPICAL WEATHER YEAR SELECTION METHOD

PROCEDURE:

1) Generally, a 10 year monthly average degree days basis.
2) Run program to compute monthly DD on 65°F base each year.
3) Above 65 degrees - cooling.
4) Below 65 degrees - heating.
5) Calculate mean (average) heating year.
6) Calculate mean (average) cooling year,
7) Find year that is closest to DDH avg.: (1968)
8) Find year that is closest to DDC avg.: (1966)
9) Select and use heating months; eg., JAN, FEB, MAR, and, NOV, DEC. (1968)
10) Select and use cooling months; eg., APR, MAY, JUN, JUL, AUG, SEP, OCT (1966)
11) Punch composite deck using (#9 & #10) months for typical year selection.

Example:

YEAR		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1962	DDH	697	230	312	78	0	0	0	0	0	39	242	509	2110
	DDC	0	9	9	89	327	408	612	690	422	224	4	0	2798
1963	DDH	779	461	142	38	9	0	0	0	0	2	220	722	2376
	DDC	0	4	57	214	312	492	623	618	397	252	36	0	3009
1964	DDH	560	566	273	53	0	2	0	618	2	58	204	510	2232
	DDC	0	0	8	111	242	401	587	587	353	37	48	4	2381
1965	DDH	442	553	481	50	2	0	0	0	0	63	111	412	2117
	DDC	10	0	0	134	187	388	556	529	449	91	32	3	2382
✓1966	DDH	684	483	212	44	22	0	0	0	0	67	147	540	2201
	DDC	4	0	12	104	244	460	645	588	395	105	52	14	2627**
1967	DDH	498	403	97	4	14	0	0	0	6	24	212	460	1722
	DDC	10	4	98	201	247	533	600	580	278	138	22	2	2718
✓1968	DDH	560	469	308	49	1	0	0	0	0	21	285	472	2167*
	DDC	0	0	12	104	210	399	421	507	297	157	34	0	2147✓
1969	DDH	454	422	416	42	17	6	0	0	0	106	319	428	2215
	DDC	10	2	3	93	124	399	596	532	321	138	19	0	2243

TOTAL DDH = 17142/8 = 2142* AVG

TOTAL DDC = 20307/8 = 2538** AVG

TABLE 11-204

AVERAGE RESIDENTIAL/SMALL COMMERCIAL COSTS

City	Natural Gas Mid Point: 2.81	Natural Gas $/MMBTU	Electricity Mid Point: 11.01	Electricity $/MMBTU	Ratio: Electricity / Gas Mid Point: 3.74
New York	1.58+	4.29	5.08+	16.09	3.75
Boston	.6 +	3.41	2.71+	13.72	4.02
Baltimore	.43+	3.24	.89+	11.90	3.67
Seattle	.51+	3.32	7.2 -	3.81	1.15
Washington, D.C.	.01+	2.82	2.93-	8.08	2.86
Philadelphia	.45+	3.26	1.09-	9.92	3.04
St. Louis	.40-	2.41	6.35-	4.66	1.93
Houston	.28+	3.09	.71+	11.72	3.79
Chicago	.49-	2.32	4.44-	6.57	2.83
San Francisco	1.39-	1.42	3.87-	7.14	5.03
Milwaukee	.47-	2.34	3.39-	7.62	3.26
Pittsburgh	.40-	2.41	1.05-	9.96	4.13
San Antonio	.14-	2.67	2.18+	13.19	4.94
Columbus	.21-	2.60	2.62+	13.63	5.24
Jacksonville	.29+	3.10	.77+	11.78	3.80
Detroit	.63-	2.18	1.88+	12.89	5.91
Phoenix	1.5 -	1.31	3.19-	7.82	5.97
Indianapolis	.81-	2.00	4.81-	6.20	3.10
New Orleans	N/A	N/A	N/A	N/A	N/A
Dallas	.69-	2.12	.16-	10.85	5.11
Los Angeles	1.07-	1.74	.08-	10.93	6.28
Cleveland	.73-	2.08	1.78-	9.23	4.47
San Diego	.72-	2.09	2.12+	13.13	6.28
Denver	1.31-	1.50	2.04-	8.47	5.98
Memphis	1.49-	1.32	5.08-	5.93	4.49
Minneapolis	.83-	1.98	1.53+	12.54	6.33
Kansas City	1.27-	1.54	5.41-	5.60	3.64
Atlanta	.92-	1.89	1.60-	9.41	4.98

Source: Gas House Heating Survey, American Gas Association, 1977.