Final Report

Richard T. Flood Jr. & Sally Elliot Flood Athletic Center
Salisbury, CT

Prepared for:
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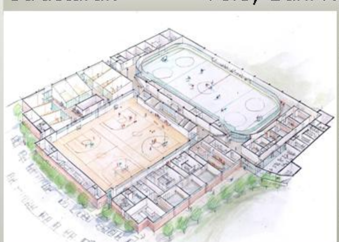
Mechanical Option

Richard T. Flood, Jr. & Sally Elliot Flood Athletic Center

Project team

Owner:	Salisbury School
Architect:	The Office of Michael Rosenfeld
Mechanical:	Cronis, Liston, Nangle, and White, LPP
Electrical:	Thompson Engineering Inc.
Structural:	Foley Buhl Roberts & Associates



Building Information

Address:	Salisbury, CT
Size:	106,386 ft^2
Levels:	2 levels
Cost:	$28.5 million
Construction Time:	June 1st 2008 – December 15th 2009
Delivery Method:	Design-Bid-Build

Architectural Design

Located on the east side of campus that consists of ice rink, squash pavilion, basketball courts, wrestling room, trainers facilities.
Façade: glass, brick, and metal panels
Roofing: Standard seam metal roof

Mechanical

(9) Air Handling Units, 87445 CFM total
(4) Burner Units, (14) pumps, (21) fans, and (28) Water Heating Coils
Specialties: (1) Ice Rink Ventilating and Dehumidifying unit installed due to the function of the building

Electrical

Electric Supply: (8) 208Y/120 3 phase 4 wire panels at 10,000 amps. (3) 480Y/277 3 phase 4 wire panels at 25,000 amps. (1) 480Y/277 3 phase 4 wire panels at 14,000 amps.
Main Lighting Ballast : T5 Fluorescent
Lighting Mount: Pendant

Structural

Floor: 5” slab on grade
Exterior Wall: Brick Veneer, 8” Cold-formed stud wall
Roof: Versa-dek metal roof deck
Truss to truss cross framing

Woong June Chung Mechanical Option
www.engr.psu.edu/ae/thesis/portfolios/2010/wuc109

Table of Content

1.0 Executive Summary

The Richard T. Richard T. Flood Jr., & Sally Elliot Flood Athletic Center was built on December 2009. Two mechanical depth studies and one breadth work were performed on this facility.

Mechanical studies are combined heat and power system and ground source heat pump system. Both of green technologies are relatively new technologies that can be estimated in computer software. BCHP Screening Software was used to estimate CHP system and Ground Loop Design software was used to estimate the cost of ground source heat pump system.

The payback period was 50 years for CHP system and 13 years for ground source heat pump system. CHP system is not feasible for this facility but ground source heat pump can be considered as one option to save the energy.

Acoustical aspect was researched due to the new mechanical equipment. Acoustical tiles can surround the equipment to reduce the Noise level.

2.0 Existing System

2.1 Background

Richard T. Flood Jr., & Sally Elliot Flood Athletic Center completed the construction on December 2009. Athletic Center is two story boarding school gymnasium facilities with area of 102,000 square feet. The gymnasium contains squash courts, basketball courts, fitness center, wrestling room, ice rink, offices, locker rooms and conference rooms.

The facility is replacement of the old gymnasium. Demolition was performed on April 2008. The purpose of the building is to provide better and bigger spaces to exercise for high school students. The name of the facility is after old headmaster and his wife. Flood Athletic Center is located on the east side of the campus.

Figure 2.1

2.2 Existing Mechanical System

2.2.1 Overall Mechanical System

Athletic center has (4) boilers that provide space heating and hot water. There are (5) hot water unit heaters to supply hot water. (9) Air handling units and (5) cabinet unit heaters serve the space heating. (2) Energy recovery ventilators have capacity to receive 14965 CFM return air and supply 13980 CFM. (18) Hot water heating coil recovers energy from energy recovery ventilators. Fluid that was used to heat up the system is water with 40% propylene glycol.

Ice rink ventilating and dehumidifying unit was installed to serve as air handling unit in the ice rink. The unit provides desiccant dehumidification technology to prevent water condensation in the air.

Figure 2.2 Munters desiccant dehumidification Unit

2.2.2 Ventilation Compliance: ASHRAE Standard 62.1

Athletic center has 9 air handling units to provide outdoor air but two air handling units in wrestling room and squash court does not provide enough outdoor air. According to ASHRAE Standard 62.1, AHU-5 and AHU-6 have to be replaced with air handling units that provides more outdoor air.

	Total CFM	O.A. CFM	Required O.A	Serving Area	Compliance
AHU -1	15400	8800	4508	Basketball Court	yes
AHU -2	15400	8800	4508	Basketball Court	yes
AHU -4	5675	2950	618	Storage	yes
AHU -5	11000	640	1906	Squash Court	no
AHU -6	6950	1500	1936	Wrestling Room, Locker Room	no
AHU -7	6270	800	741	Weight Room, Locker Room	yes
AHU -8	10000	855	416	Corridor	yes
AHU -9	4550	1400	815	Athlete Waiting Room	yes
AHU -10	1200	360	69	Offices	yes

Table 2.1 Compliance of Minimum Requirement of Outdoor Air

2.2.3 ASHRAE Standard 90.1

ASHRAE Standard 90.1 verifies the minimum efficiency requirement of building. Building energy efficiency can be calculated in building envelope and mechanical equipments. Inspection was performed in the areas of building envelope, heating, ventilating, air conditioning, service water heating, and lighting.

Minimum Energy Efficiency

- Vertical glazing area on building envelop has to be less than 40%
- R-value of the roof has to be greater than the required R-value
- (CFM provided by fan) * 0.0015 needs to be greater than horsepower used by fan
- Efficiency of the boiler needs to be greater 80%
- Lighting power density should not exceed allowable value of 1.1W/ft^2

2.2.4 Annual Energy Analysis

The space heating and water heating were provided by natural gas is 35% of total energy consumption. 65% of energy consumption was done by electricity to power lighting, ventilations, pumps, space cooling, and misc. equipment.

Figure 2.3 explains how much energy was used in each category. Figure 2.4 describes how much gas and electricity was used in each month.

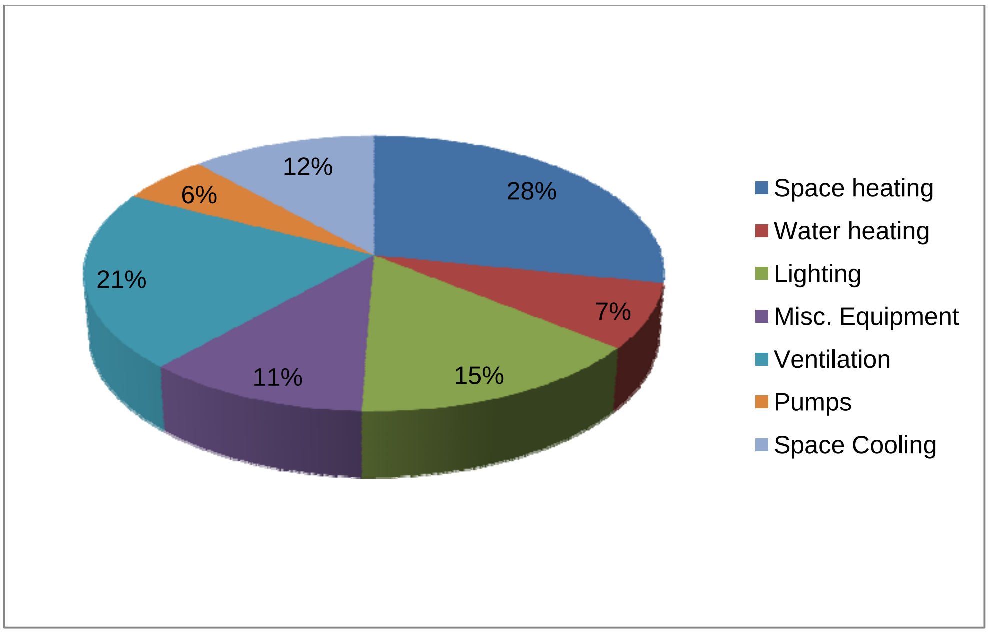


Figure 2.3

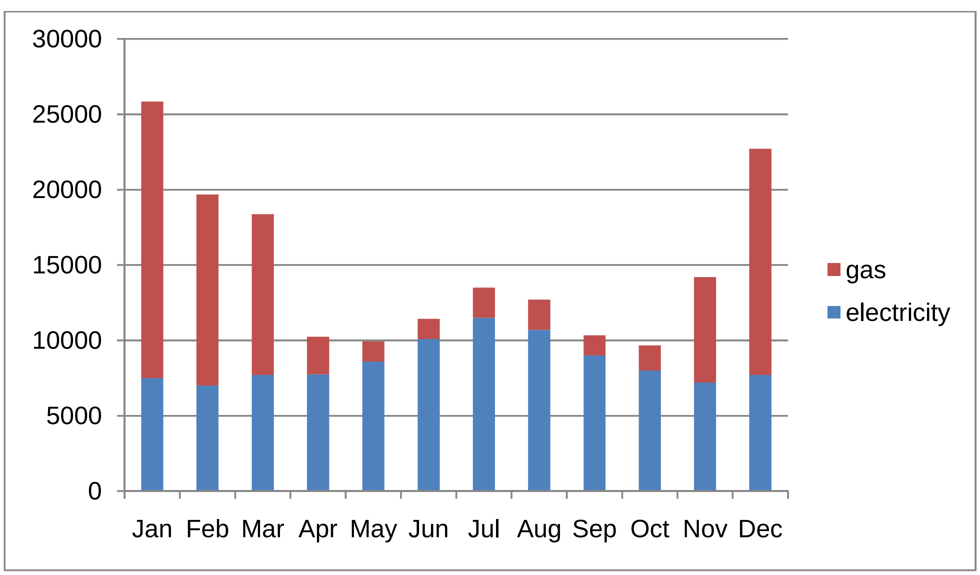


Figure 2.4

3.0 Redesign Mechanical System

3.1 Resize Air Handling Units

According to ASHRAE Standard 62.1, air handling unit in squash court and wrestling room does not provide enough outdoor air. Supplying more outdoor air will increase the air quality in the building.

AHU5
Required O.A. – 1906cfm
Provided O.A. – 640cfm
Manufacturer – TRANE model#LPCAA21 providing 5.8% of OA

AHU6
Required O.A. – 1936cfm
Provided O.A. – 1500cfm
Manufacturer– TRANE model#LPCAA14 providing 21.6% of OA

Replacing AHU-5 and AHU-6 to Trane model# LPCAA17 will increase the air quality of spaces. it will provides 2950CFM O.A. which meets minimum O.A. according to ASHRAE Standard 62.1.

3.2 Combined Heat and Power System

Combined heat and power system generates electricity on site and recovers the heat coming out of engine or turbine. Heat recovery unit such as heat exchanger or absorption chiller will utilize the hot exhaust gases for heating, cooling or dehumidification. System can be visualized by figure 3.1 below.

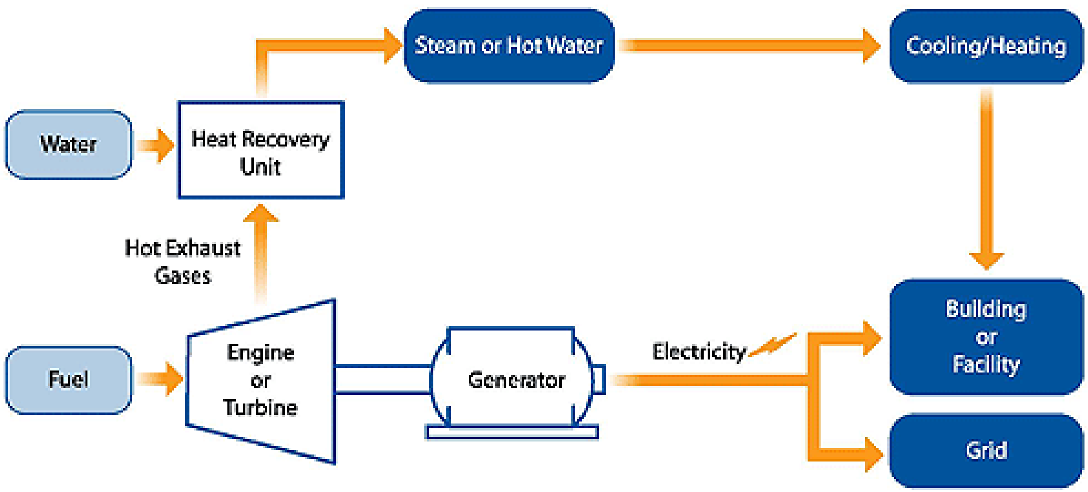


Figure 3.1 CHP System

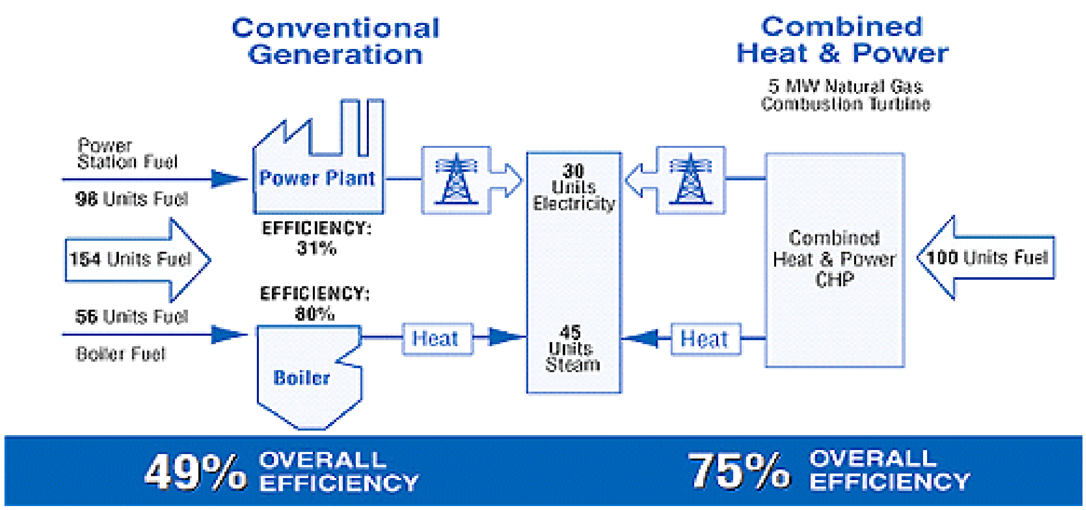


Figure 3.2 Efficiency of CHP vs. SHP

In general, electricity that was provided by power plant has low efficiency as 31% and boiler in the building has 80% efficiency. Figure 3.2 shows how separated heat and power system requires 154 units fuel to operate the building while combined heat and power system requires only 100 units fuel.

3.2.1 Spark Spread

Calculating spark spread can be one way to test the feasibility of CHP system. Spark spread is equal to subtracting electricity rate by natural gas rate. Difference of electricity and natural gas rate should exceed $12/MMBtu. Since CHP system uses only natural gas to operate the building, lower natural gas rate will make the operating cost to be lower.

Electricity – Northeastern Utilities suppliers provide electricity rate of 0.09051/kWh to commercial buildings.
Electricity rate =(0.09051/kWh) * (1 kWh / 0.003412 MMBtu) = **$26.53/MMBtu**

Natural gas – Natural gas price was adjusted by the government and it is 14.81 dollar/ 1000 cubic feet.
Natural gas rate = 14.81 dollar/ 1000 cubic feet *1.029 = **$15.24/ MMBtu**

Spark Spread = electricity rate – natural gas rate
=$26.53/ MMBtu – $15.24/ MMBtu = **$11.29/ MMBtu**

Spark spread does not exceed $12/MMBtu, therefore it may not be feasible to install CHP system in the building due to the comparison of electricity and gas price.

3.2.2 BCHP Screening Tool

The document, Catalog of CHP Technologies provided by Combined Heat and Power Partnership contributed the table to help selecting the prime mover of CHP system. Start-up time and noise of the equipment was considered when prime mover was selected. Since school facility does not run 24/7, it requires short start-up time. Gas turbine, recip. engine, and microturbine were very good candidate due to low start-up time. Recip. Engine was selected because it has the highest efficiency.

Table III: Summary Table of Typical Cost and Performance Characteristics by CHP Technology*

Technology	Steam Turbine[1]	Recip. Engine	Gas Turbine	Microturbine	Fuel Cell
Power efficiency (HHV)	15-38%	22-40%	22-36%	18-27%	30-63%
Overall efficiency (HHV)	80%	70-80%	70-75%	65-75%	55-80%
Effective electrical efficiency	75%	70-80%	50-70%	50-70%	55-80%
Typical capacity (MW_e)	0.5-250	0..01-5	0.5-250	0.03-0.25	0.005-2
Typical power to heat ratio	0.1-0.3	0.5-1	0.5-2	0.4-0.7	1-2
Part-load	ok	ok	poor	ok	good
CHP Installed costs ($/kW$_e$)	430-1,100	1,100-2,200	970-1,300 (5-40 MW)	2,400-3,000	5,000-6,500
O&M costs ($/kWh$_e$)	<0.005	0.009-0.022	0.004-0.011	0.012-0.025	0.032-0.038
Availability	near 100%	92-97%	90-98%	90-98%	>95%
Hours to overhauls	>50,000	25,000-50,000	25,000-50,000	20,000-40,000	32,000-64,000
Start-up time	1 hr - 1 day	10 sec	10 min - 1 hr	60 sec	3 hrs - 2 days
Fuel pressure (psig)	n/a	1-45	100-500 (compressor)	50-80 (compressor)	0.5-45
Fuels	all	natural gas, biogas, propane, landfill gas	natural gas, biogas, propane, oil	natural gas, biogas, propane, oil	hydrogen, natural gas, propane, methanol
Noise	high	high	moderate	moderate	low
Uses for thermal output	LP-HP steam	hot water, LP steam	heat, hot water, LP-HP steam	heat, hot water, LP steam	hot water, LP-HP steam
Power Density (kW/m^2)	>100	35-50	20-500	5-70	5-20
NO_x (lb/MMBtu) (not including SCR)	Gas 0.1-.2 Wood 0.2-.5 Coal 0.3-1.2	0.013 rich burn 3-way cat. 0.17 lean burn	0.036-0.05	0.015-0.036	0.0025-.0040
lb/MWh$_{TotalOutput}$ (not including SCR)	Gas 0.4-0.8 Wood 0.9-1.4 Coal 1.2-5.0.	0.06 rich burn 3-way cat. 0.8 lean burn	0.17-0.25	0.08-0.20	0.011-0.016

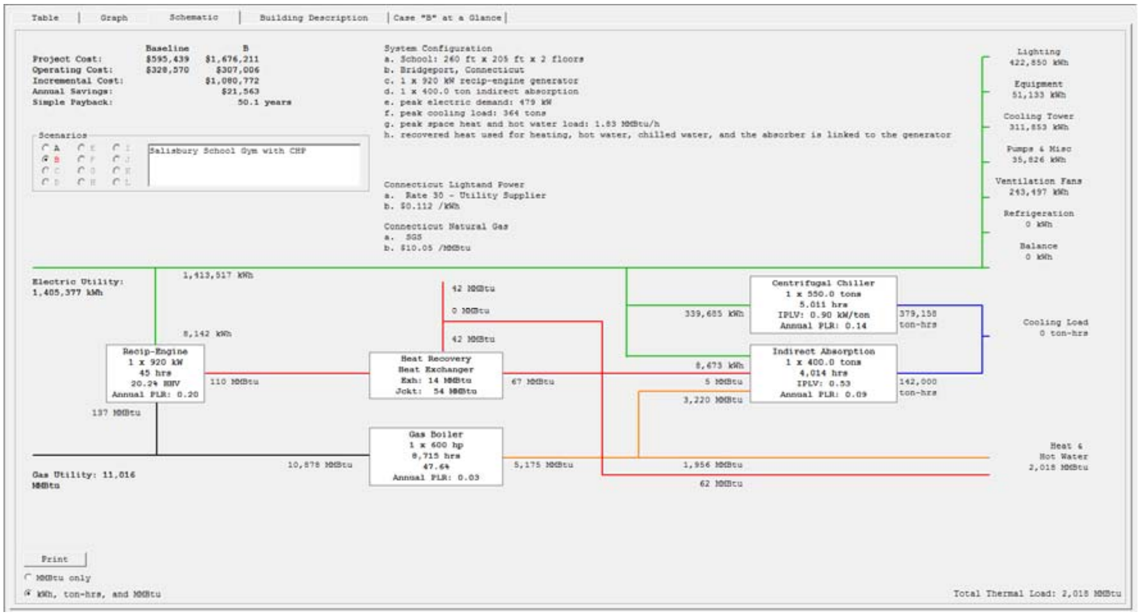
* Data are illustrative values for typically available systems; All costs are in 2007$

[1]For steam turbine, not entire boiler package

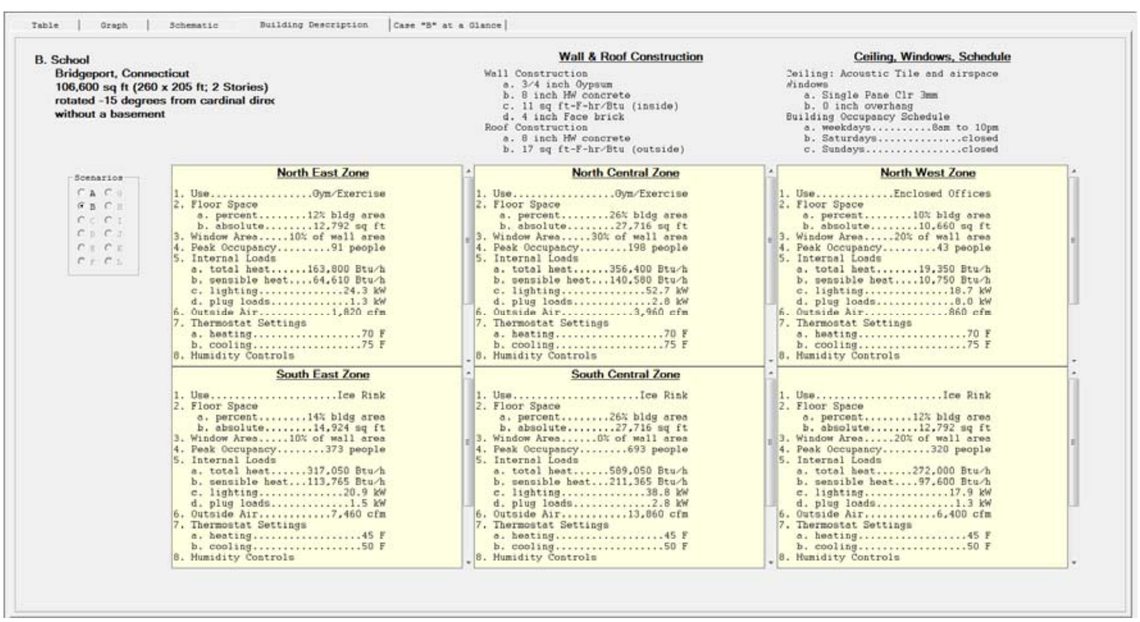
Figure 3.3 Selecting the CHP system Prime Movers

Noise from equipment can be also critical issue in the gymnasium since the building hold ice rink and basketball court. Big auditorium spaces can create echoes due to the high reverberation time. But installing prime mover outside will solve the problem.

BCHP Screening Tool was used to analyze the amount of energy used. The schematics of the CHP system is shown on Figure 3.4.



3.4 Schematics of CHP



3.5 Building Usage

3.2.3 Consideration of Emission for CHP

CHP system can reduce the amount of emission. Table 3.1 is a spreadsheet provided by Northeast CHP Application Center. The spreadsheet calculated annual emission from CHP. It describes how much emission is exhausted from CHP system

Natural Gas Fired Engine				
CHP Operation Per Year (hr):		**1,600**		
Fuel Input (MMBtu/hr):		**15.24**		
Attainment				
Pollutant	Emissions Factor* (lbs/MMBtu Fuel Input)	Emissions (lbs)	PSD Major Modification Significant Level (tpy)	PSD Major Source Thresholds (tpy)
PM	0.009910	241.65	15	250**
S0x	0.000588	14.34	40	250**
N0x	0.847000	20653.25	40	250**
VOM	0.118000	2877.31	40	250**
CO	0.557000	13581.89	100	250**
Formaldehyde	0.052800	1287.48	10	10

Table 3.1 Emission

	Current System	CHP system	Percentage
NOx	48714lb	20653lb	57.60%
SOx	14756lb	14lb	99.1%

Table 3.2 Comparison of Annual Emission

CHP system can decrease NOx by 57% and SOx by 99.1% according to data taken from spreadsheet and eQuest. Table 3.2 described exact amount of emission for NOx and SOx.

3.3 The Ground Source Heat Pump System

Ground source heat pump will utilize the underground temperature. On summer, the surface of the Earth will be heated by the Sun but since the Earth has enormous mass, underground temperature will maintain the lower temperature. On winter, the underground temperature will remain higher than the building temperature.

Ground source heat pump system requires ground drilling, tRunning the water mixed with 23.5% Propylene Glycol will lower the freezing point to 15^{o}F to prevent the water to freeze on winter.

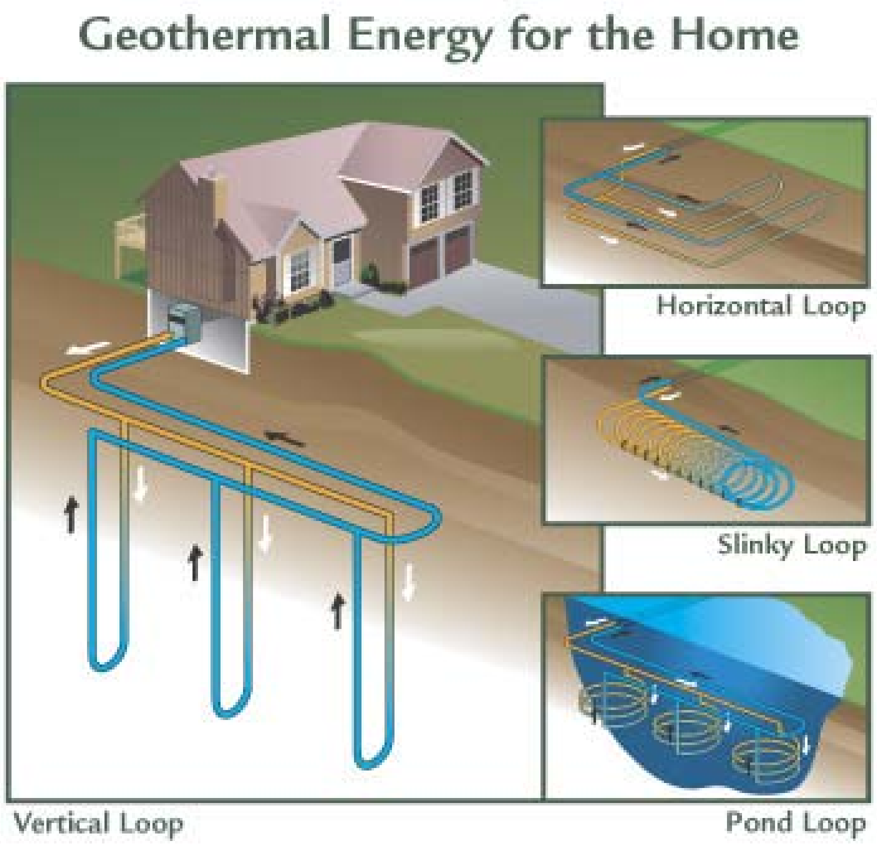


Figure 3.6 Geothermal Energy

According to the soil data, Stockbridge Loam forms most of the ground where ground source heat pump system will be installed. Stockbridge Loam has a thermal conductivity of 1.15 Btu/(h*ft*F) and thermal diffusivity of 1.38 ft^2/day.

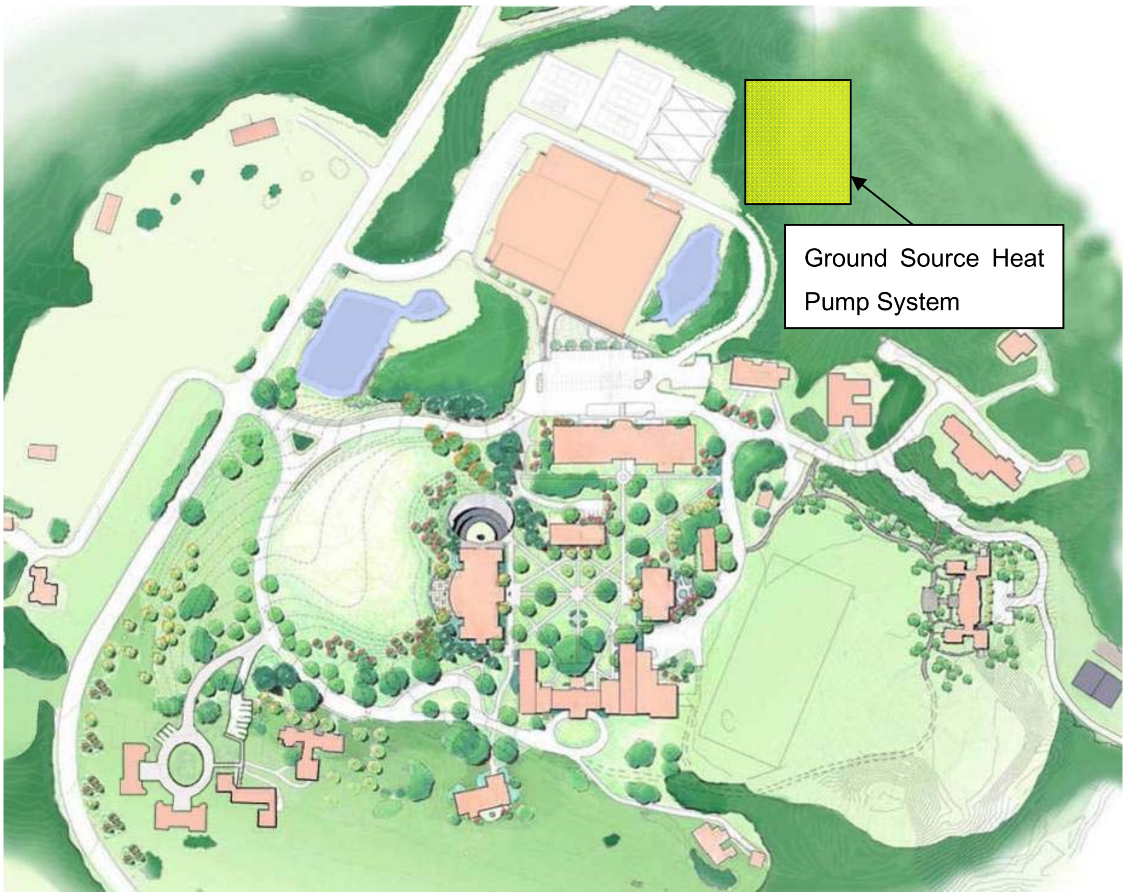


Figure 3.7 Ground Source Heat Pump Location

The estimation of ground source heat pump system was performed by using Ground Loop Design software. The location of ground source heat pump system will be on east side of the campus.

3.4 Cost Estimation

The cost estimation of CHP system was done with BCHP Screening Tool software. The initial installation cost of CHP system was $1,676,211. The initial cost of SHP system was $595,439. The annual saving was $21,563. The payback period was closed to 50 years.

The payback period of ground source heat pump system was calculated with Ground Loop Design software. The initial installation cost of equipment and drilling work is $63,900. Annual saving is $4,900 and payback period is 13 years.

4.0 Acoustical Breadth

Due to the loud noise from prime mover from CHP system, acoustical treatment had to be performed to maintain the function of the building. Gymnasium is sensitive to acoustic effect because it contains large auditorium spaces such as basketball courts and ice rink.

Prime mover and pumps can be installed outside of the facility. Acoustical tiles will surround the mechanical equipment to reduce the noise. Acoustiblok is feasible to install around the heat pump since the tile has an ability to tolerate the severe weather conditions.

Figure 4.1 Acoustical Tiles

Figure 4.2 Acoustical Tiles on Pumps

Pre-Installation Readings				Post-Installation Readings				Difference	
N.C.	Lmtg Band (Hz)	Lmtg Band dB	SPL (dB)	N.C.	Lmtg Band (Hz)	Lmtg Band dB	SPL (dB)	N.C.	SPL (dB)
52	1000	53.7	85.6	38	63	39	45	**-14**	**-40.6**
52	1000	54.2	86.1	47	250	49.1	62.4	**-5**	**-23.7**
46	1000	49.2	72	40	500	41.1	47.7	**-6**	**24.3**
49	1000	49.8	62.3	39	63	39	44.5	**-10.2**	**-17.8**
46	1000	50	64.1	39	250	40.8	46	**-7**	**-18.1**
53	500	49.1	72	41	63	43.6	46.3	**-12**	**-25.7**
50	1000	49.2	71.2	38	63	42.7	46.3	**-12**	**-24.9**
49	1000	49.7	70.1	42	500	45.1	50.9	**-7**	**-19.2**
47	1000	49.3	65.6	40	250	42.1	47.1	**-7**	**-18.5**
53	250	53.7	76.4	44	250	46.1	51.1	**-9**	**-25.3**
53	250	55.1	69.2	45	250	47.1	51.7	**-8**	**-17.5**
54	250	56.9	69.2	44	250	45.5	51	**-10**	**-18.2**
50	250	57.1	70.1	44	250	45	50.1	**-6**	**-20**
52	500	53.2	83.5	44	250	44.9	51.2	**-8**	**-32.3**
55	1000	54.3	71.8	43	250	45	49.1	**-12**	**-22.7**
53	250	59	76.8	42	63	43	48.6	**-11**	**-28.2**
56	63	51	63.7	38	2000	41.2	45.4	**-18**	**-18.3**
							Average	-9.54	-20.39

Table 4.1 Noise Reduction

All weather acoustical tiles will reduces N.C in average of 9.54.

Wall panels can be installed in the basketball court to reduce the NL.

	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	NRC
Absorption	0.28	0.54	0.99	1.02	0.94	0.9	0.085

5.0 Reference

Ice rink ventilation unit

http://www.munters.us/en/us/Division-start-pages/Dehumidification/

Catalog of CHP technology

http://www.epa.gov/chp/basic/catalog.html

CHP basic information

http://www.epa.gov/chp/basic/index.html

BCHP Screening Tool

http://www.coolingheatingpower.org/bchp-screening-tool-now-available.xhtml

Natural gas rate

http://tonto.eia.doe.gov/dnav/ng/hist/n3010ct3m.htm

Acoustiblok tiles

http://www.acoustiblok.com/industrial2.html#9

Ground Source Heat Pump System

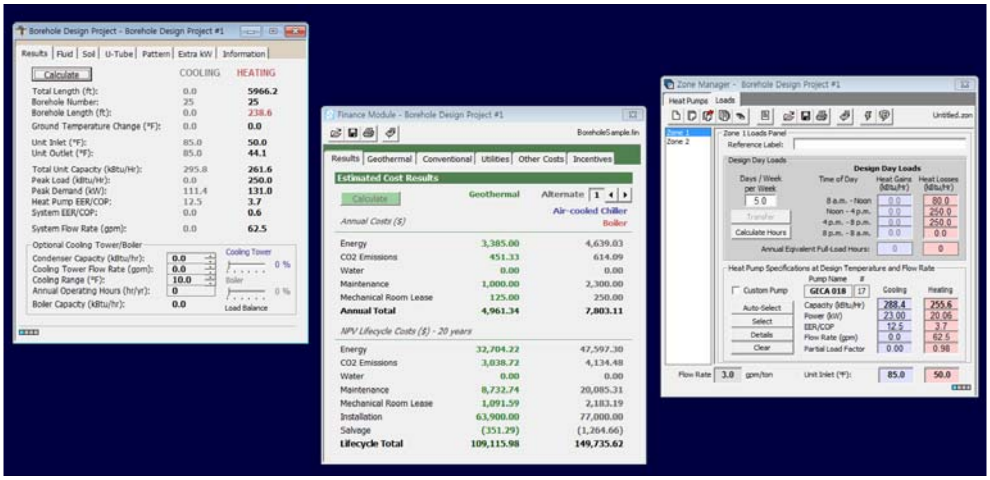
http://www.gaiageo.com/index.htm

Geothermal Energy Picture

http://canadiangeo.ca/UserFiles/File/geothermal_heat_pump.jpg

6.0 Appendix

Soil data


Borehole Design Project - Borehole Design Project #1
Results
Fluid
Soil
U-Tube
Pattern
Extra kW
Information
Calculate
COOLING
HEATING
Total Length (ft):
Borehole Number:
Borehole Length (ft):
Ground Temperature Change (°F):
Unit Inlet (°F):
Unit Outlet (°F):
Total Unit Capacity (kBtu/Hr):
Peak Load (kBtu/Hr):
Peak Demand (kW):
Heat Pump EER/COP:
System EER/COP:
System Flow Rate (gpm):
Optional Cooling Tower/Boiler
Finance Module - Borehole Design Project #1
Estimated Cost Results
Geothermal
Alternate
Air-cooled Chiller
Boiler
Annual Costs ($)
Energy
CO2 Emissions
Water
Maintenance
Mechanical Room Lease
Annual Total
NPV Lifecycle Costs ($) - 20 years
Installation
Salvage
Lifecycle Total
Zone Manager - Borehole Design Project #1
Heat Pumps
Loads
Zone 1
Zone 2
Design Day Loads
Heat Pump Specifications at Design Temperature and Flow Rate

1. Major Plant Equipment Sizes		
a. Boiler	MMBtuh	6.500
b. Lead Elec Chiller	MMBtuh	
c. Lag Elec Chiller	MMBtuh	1.349
d. Lead Steam Absorber	MMBtuh	2.505
e. Lag Steam Absorber	MMBtuh	
f. Gas Absorber	MMBtuh	
g. Engine-Driven Chiller	MMBtuh	
h. Cooling Tower	MMBtuh	4.064
i. Generator	MMBtuh	1.175
j. Boiler	hp	194.1516
k. Lead Elec Chiller	tons	0
l. Lag Elec Chiller	ton	112.4167
m. Lead Steam Absorber	ton	208.75
n. Lag Steam Absorber	ton	0
o. Gas Absorber	ton	0
p. Engine-Driven Chiller	ton	0
q. Cooling Tower	ton	338.6667
r. Generator	kW	344.2719
2. Annual Hours		
a. Cooling Hours	hours	6905
b. Heating Hours	hours	3542
c. Fan Hours	hours	7133
d. Generator Hours	Hours	1401
3. DOE2.1e Report PS-C		
a. boiler plant parameters		
(1) boiler operating time	Hrs	7407
(2) boiler steam production	MMBtu	4050.2
(3) boiler fuel input	MMBtu	4931.1
b. chilled water plant #1 parameters		
(1) chiller type		HERM-REC-CHLR
(2) operating time	Hrs	6317
(3) chilled water production	MMBtu	4796.5
(4) power consumption	kWh	234560.
(5) chiller thermal input	MMBtu	0.0
c. chilled water plant #2 parameters		
(1) chiller type		ABSOR1-CHLR
(2) operating time	Hrs	3552
(3) chilled water production	MMBtu	1623.8
(4) power consumption	kWh	5945.
(5) chiller thermal input	MMBtu	3066.7
4. Annual Electricity Consumption		
a. Lights	kWh	422850.
b. Equipment	kWh	51133.
c. Heating	kWh	
d. Cooling	kWh	240505.
e. Cooling Tower	kWh	148601.
f. Pump and Misc	kWh	37447.
g. Ventilation Fans	kWh	249883.
h. Refrigeration	kWh	
i. Supplemental Heat	kWh	
j. Service Water Heat	kWh	
k. Total	kWh	1150418.
5. Annual Gas Consumption		
a. Heating	MMBtu	616.6
b. Cooling	MMBtu	3262.7

1. Major Plant Equipment Sizes		
a. Boiler	MMBtuh	20.087
b. Lead Elec Chiller	MMBtuh	
c. Lag Elec Chiller	MMBtuh	6.600
d. Lead Steam Absorber	MMBtuh	4.800
e. Lag Steam Absorber	MMBtuh	
f. Gas Absorber	MMBtuh	
g. Engine-Driven Chiller	MMBtuh	
h. Cooling Tower	MMBtuh	10.141
i. Generator	MMBtuh	3.140
j. Boiler	hp	599.988
k. Lead Elec Chiller	tons	0
l. Lag Elec Chiller	ton	550
m. Lead Steam Absorber	ton	400
n. Lag Steam Absorber	ton	0
o. Gas Absorber	ton	0
p. Engine-Driven Chiller	ton	0
q. Cooling Tower	ton	845.0833
r. Generator	kW	920.0118
2. Annual Hours		
a. Cooling Hours	hours	6502
b. Heating Hours	hours	3522
c. Fan Hours	hours	7131
d. Generator Hours	Hours	45
3. DOE2.1e Report PS-C		
a. boiler plant parameters		
(1) boiler operating time	Hrs	8715
(2) boiler steam production	MMBtu	5175.3
(3) boiler fuel input	MMBtu	10878.0
b. chilled water plant #1 parameters		
(1) chiller type		HERM-REC-CHLR
(2) operating time	Hrs	5011
(3) chilled water production	MMBtu	4549.9
(4) power consumption	kWh	339685.
(5) chiller thermal input	MMBtu	0.0
c. chilled water plant #2 parameters		
(1) chiller type		ABSOR1-CHLR
(2) operating time	Hrs	4014
(3) chilled water production	MMBtu	1704.0
(4) power consumption	kWh	8673.
(5) chiller thermal input	MMBtu	3224.5
4. Annual Electricity Consumption		
a. Lights	kWh	422850.
b. Equipment	kWh	51133.
c. Heating	kWh	
d. Cooling	kWh	348358.
e. Cooling Tower	kWh	311853.
f. Pump and Misc	kWh	35826.
g. Ventilation Fans	kWh	243497.
h. Refrigeration	kWh	
i. Supplemental Heat	kWh	
j. Service Water Heat	kWh	
k. Total	kWh	1413517.
5. Annual Gas Consumption		
a. Heating	MMBtu	2035.6
b. Cooling	MMBtu	6478.4

a. Utility Supplied	kWh	982423.1
b. On-site Generation	kWh	167997.2
c. Operating Hours	Hours	1401
7. Recovered Heat Sources and Applicat		
a. thermal sources		
(1) boiler	MMBtu	4050.2
(2) generator exhaust	MMBtu	280.4
(3) generator jacket	MMBtu	794.5
(4) engine driven chiller	MMBtu	
(5) direct fired chiller heater	MMBtu	
b. applications of recovered heat		
(1) space heating	MMBtu	490.0
(2) space cooling	MMBtu	382.0
(3) service hot water	MMBtu	203.0
(4) total use of recovered heat	MMBtu	1074.9
(5) wasted recovered heat	MMBtu	0.0
8. Boiler Operation		
a. Steam / Hot Water Produced	MMBtu	4050.2
b. Fuel Consumption	MMBtu	4931.1
c. Efficiency		.8211918
9. Building Loads		
a. Space Heating & DHW Load	MMBtu	2350.241
b. Space Cooling Load	MMBtu	6420.3
c. Electricity Load	kWh	1150418
d. Average Heating Load	MMBtu/h	.663535
e. Average Space Cooling Load	MMBtu/h	.9298044
10. Emission Calculations		
a. Generator Gas Use	MMBtu	2495.5
b. Engine Chiller Gas Use	MMBtu	
c. Other Gas Use	MMBtu	4931.3
d. Utility Electricity	kWh	982423.1
e. Site Generator NOx	lb	2021.355
f. Engine Chiller NOx	lb	0
g. Other Gas Use NOx	lb	483.2674
h. Electric Utility NOx	lb	2914.849
i. Total NOx	lb	5419.472
j. Site Generator SOx	lb	2495.5
k. Engine Chiller SOx	lb	0
l. Other Gas Use SOx	lb	2.909467
m. Electric Utility SOx	lb	5937.765
n. Total SOx	lb	8436.175
o. Site Generator CO	lb	0
p. Engine Chiller CO	lb	0
q. Other Gas Use CO	lb	406.3391
r. Electric Utility CO	lb	392.9692
s. Total CO	lb	799.3083
t. Site Generator CO2	lb	1147930
u. Engine Chiller CO2	lb	0
v. Other Gas Use CO2	lb	581893.4
w. Electric Utility CO2	lb	1367533
x. Total CO2	lb	3097357
11. Electric Use Profile		
a. January Use	kWh	74229.1
b. February Use	kWh	66289.9
c. March Use	kWh	75645.1
d. April Use	kWh	82737.1

a. Utility Supplied	kWh	1405377.1
b. On-site Generation	kWh	8142.3
c. Operating Hours	Hours	45
7. Recovered Heat Sources and Applicat		
a. thermal sources		
(1) boiler	MMBtu	5175.3
(2) generator exhaust	MMBtu	13.6
(3) generator jacket	MMBtu	53.7
(4) engine driven chiller	MMBtu	
(5) direct fired chiller heater	MMBtu	
b. applications of recovered heat		
(1) space heating	MMBtu	56.2
(2) space cooling	MMBtu	4.9
(3) service hot water	MMBtu	6.2
(4) total use of recovered heat	MMBtu	67.3
(5) wasted recovered heat	MMBtu	0.0
8. Boiler Operation		
a. Steam / Hot Water Produced	MMBtu	5175.3
b. Fuel Consumption	MMBtu	10878.0
c. Efficiency		.4757147
9. Building Loads		
a. Space Heating & DHW Load	MMBtu	2205.497
b. Space Cooling Load	MMBtu	6253.8
c. Electricity Load	kWh	1413517
d. Average Heating Load	MMBtu/h	.6262059
e. Average Space Cooling Load	MMBtu/h	.9618271
10. Emission Calculations		
a. Generator Gas Use	MMBtu	137.4
b. Engine Chiller Gas Use	MMBtu	
c. Other Gas Use	MMBtu	10878.2
d. Utility Electricity	kWh	1405377
e. Site Generator NOx	lb	560.592
f. Engine Chiller NOx	lb	0
g. Other Gas Use NOx	lb	1066.064
h. Electric Utility NOx	lb	4169.753
i. Total NOx	lb	5796.409
j. Site Generator SOx	lb	.0807912
k. Engine Chiller SOx	lb	0
l. Other Gas Use SOx	lb	6.418138
m. Electric Utility SOx	lb	8494.099
n. Total SOx	lb	8500.598
o. Site Generator CO	lb	43.5558
p. Engine Chiller CO	lb	0
q. Other Gas Use CO	lb	896.3637
r. Electric Utility CO	lb	562.1508
s. Total CO	lb	1502.07
t. Site Generator CO2	lb	15114
u. Engine Chiller CO2	lb	0
v. Other Gas Use CO2	lb	1283628
w. Electric Utility CO2	lb	1956285
x. Total CO2	lb	3255027
11. Electric Use Profile		
a. January Use	kWh	84911.0
b. February Use	kWh	75561.8
c. March Use	kWh	91271.8
d. April Use	kWh	106710.6

12. Electric Demand Profile		
a. January Peak	kW	268.8
b. February Peak	kW	250.6
c. March Peak	kW	279.8
d. April Peak	kW	284.2
e. May Peak	kW	366.1
f. June Peak	kW	453.1
g. July Peak	kW	455.5
h. August Peak	kW	454.1
i. September Peak	kW	439.2
j. October Peak	kW	378.8
k. November Peak	kW	305.9
l. December Peak	kW	275.1
m. Annual Peak	kW	455.5
n. Annual Average Demand	kW	131.3262
13. Gas Use Profile		
a. January Use	therm	7003.7
b. February Use	therm	6278.6
c. March Use	therm	4574.8
d. April Use	therm	2742.4
e. May Use	therm	3499.9
f. June Use	therm	7085.6
g. July Use	therm	11454.0
h. August Use	therm	12499.9
i. September Use	therm	5693.7
j. October Use	therm	3920.5
k. November Use	therm	3580.4
l. December Use	therm	5934.2
14. Cooling Peak Hour		
a. Time		JUL 18 7PM
b. Outside Temp	F	84
c. Outside Wetbulb	F	71
d. Outside Solar	Btuh/sqft	68
e. Wall Conduct	kBtuh	41.575
f. Roof Conduct	kBtuh	131.158
g. Window Cond	kBtuh	78.978
h. Window Solar	kBtuh	217.849
i. Underground	kBtuh	-1.183
j. Occupant Sens	kBtuh	330.482
k. Occupant Lat	kBtuh	556.669
l. Light	kBtuh	246.964
m. Equipment	kBtuh	25.446
n. Infiltration	kBtuh	131.791
o. Infilt. Lat.	kBtuh	110.873
p. Total Sens.	kBtuh	1203.060
q. Total	kBtuh	1870.603
15. Heating Peak Hour		
a. Time		JAN 28 6AM
b. Outside Temp	F	8
c. Outside Solar		0
d. Wall Conduct	kBtuh	-54.192
e. Roof Conduct	kBtuh	-150.455
f. Window Cond	kBtuh	-219.796
g. Window Solar	kBtuh	21.004
h. Underground	kBtuh	-28.022
i. Occupant Sens	kBtuh	5.911

12. Electric Demand Profile		
a. January Peak	kW	287.6
b. February Peak	kW	279.1
c. March Peak	kW	344.9
d. April Peak	kW	350.5
e. May Peak	kW	395.3
f. June Peak	kW	478.8
g. July Peak	kW	505.0
h. August Peak	kW	498.2
i. September Peak	kW	427.5
j. October Peak	kW	400.3
k. November Peak	kW	350.6
l. December Peak	kW	309.2
m. Annual Peak	kW	505.0
n. Annual Average Demand	kW	161.3604
13. Gas Use Profile		
a. January Use	therm	9707.5
b. February Use	therm	8773.2
c. March Use	therm	8205.2
d. April Use	therm	7095.3
e. May Use	therm	8169.7
f. June Use	therm	10427.0
g. July Use	therm	11139.7
h. August Use	therm	12091.5
i. September Use	therm	9776.8
j. October Use	therm	8067.6
k. November Use	therm	7757.0
l. December Use	therm	8945.4
14. Cooling Peak Hour		
a. Time		JUL 18 7PM
b. Outside Temp	F	84
c. Outside Wetbulb	F	71
d. Outside Solar	Btuh/sqft	68
e. Wall Conduct	kBtuh	41.460
f. Roof Conduct	kBtuh	131.158
g. Window Cond	kBtuh	80.831
h. Window Solar	kBtuh	231.631
i. Underground	kBtuh	-1.183
j. Occupant Sens	kBtuh	330.482
k. Occupant Lat	kBtuh	556.669
l. Light	kBtuh	246.964
m. Equipment	kBtuh	25.446
n. Infiltration	kBtuh	131.791
o. Infilt. Lat.	kBtuh	110.873
p. Total Sens.	kBtuh	1218.579
q. Total	kBtuh	1886.122
15. Heating Peak Hour		
a. Time		JAN 28 6AM
b. Outside Temp	F	8
c. Outside Solar		0
d. Wall Conduct	kBtuh	-54.710
e. Roof Conduct	kBtuh	-150.455
f. Window Cond	kBtuh	-217.265
g. Window Solar	kBtuh	25.098
h. Underground	kBtuh	-28.022
i. Occupant Sens	kBtuh	5.911

d. South East Perimeter Zone	CFM	17035.
e. South Central Perimeter Zone	CFM	24525.
f. South West Perimeter Zone	CFM	19485.
g. North East Core Zone	CFM	-
h. North Central Core Zone	CFM	-
i. North West Core Zone	CFM	-
j. South East Core Zone	CFM	-
k. South Central Core Zone	CFM	-
l. South West Core Zone	CFM	-
m. Perimeter Total	CFM	91231
n. Core Total	CFM	0
o. Total	CFM	91231
17. Fan Electricity		
a. During Cooling	kWh	75539.133
b. During Heating	kWh	233208.625
c. During Floating	kWh	8.443
18. Chilled Water Energy in MMBtu		
a. January	MMBtu	89.18150
b. February	MMBtu	83.05858
c. March	MMBtu	136.25978
d. April	MMBtu	238.22163
e. May	MMBtu	549.98822
f. June	MMBtu	891.68610
g. July	MMBtu	1198.67407
h. August	MMBtu	1223.11914
i. September	MMBtu	775.56116
j. October	MMBtu	518.29730
k. November	MMBtu	241.97517
l. December	MMBtu	102.95541
m. Annual	MMBtu	6048.984
n. Peak	kBtuh	4483.984
o. Average	kBtuh	875.9027
19. Chilled Water Energy		
a. January	Ton-Hours	7431.792
b. February	Ton-Hours	6921.548
c. March	Ton-Hours	11354.98
d. April	Ton-Hours	19851.8
e. May	Ton-Hours	45832.35
f. June	Ton-Hours	74307.18
g. July	Ton-Hours	99889.51
h. August	Ton-Hours	101926.6
i. September	Ton-Hours	64630.1
j. October	Ton-Hours	43191.44
k. November	Ton-Hours	20164.6
l. December	Ton-Hours	8579.617
20. Peak Chilled Water Use in kBtuh		
a. January	kBtuh	565.493
b. February	kBtuh	746.540
c. March	kBtuh	883.490
d. April	kBtuh	1430.086
e. May	kBtuh	2887.408
f. June	kBtuh	4070.924
g. July	kBtuh	4483.984
h. August	kBtuh	4427.152
i. September	kBtuh	3535.687
j. October	kBtuh	3353.700

d. South East Perimeter Zone	CFM	8790.
e. South Central Perimeter Zone	CFM	4160.
f. South West Perimeter Zone	CFM	12772.
g. North East Core Zone	CFM	3679.
h. North Central Core Zone	CFM	11079.
i. North West Core Zone	CFM	2569.
j. South East Core Zone	CFM	8321.
k. South Central Core Zone	CFM	20376.
l. South West Core Zone	CFM	6689.
m. Perimeter Total	CFM	38298
n. Core Total	CFM	52713
o. Total	CFM	91011
17. Fan Electricity		
a. During Cooling	kWh	66221.523
b. During Heating	kWh	219616.891
c. During Floating	kWh	2490.725
18. Chilled Water Energy in MMBtu		
a. January	MMBtu	74.91589
b. February	MMBtu	71.09219
c. March	MMBtu	129.64645
d. April	MMBtu	235.55672
e. May	MMBtu	540.06451
f. June	MMBtu	874.62421
g. July	MMBtu	1175.02759
h. August	MMBtu	1198.27405
i. September	MMBtu	764.34869
j. October	MMBtu	510.99167
k. November	MMBtu	235.43642
l. December	MMBtu	91.39529
m. Annual	MMBtu	5901.379
n. Peak	kBtuh	4371.763
o. Average	kBtuh	907.4856
19. Chilled Water Energy		
a. January	Ton-Hours	6242.991
b. February	Ton-Hours	5924.35
c. March	Ton-Hours	10803.87
d. April	Ton-Hours	19629.73
e. May	Ton-Hours	45005.38
f. June	Ton-Hours	72885.35
g. July	Ton-Hours	97918.97
h. August	Ton-Hours	99856.17
i. September	Ton-Hours	63695.73
j. October	Ton-Hours	42582.64
k. November	Ton-Hours	19619.7
l. December	Ton-Hours	7616.274
20. Peak Chilled Water Use in kBtuh		
a. January	kBtuh	604.077
b. February	kBtuh	807.439
c. March	kBtuh	904.660
d. April	kBtuh	1425.760
e. May	kBtuh	2882.744
f. June	kBtuh	3899.043
g. July	kBtuh	4336.835
h. August	kBtuh	4371.763
i. September	kBtuh	3500.400
j. October	kBtuh	3314.412

f. June	Ton	339.2437
g. July	Ton	373.6653
h. August	Ton	368.9293
i. September	Ton	294.6406
j. October	Ton	279.475
k. November	Ton	161.6525
l. December	Ton	61.77117
22. DX Cooling Energy in MMBtu		
a. January	MMBtu	-
b. February	MMBtu	-
c. March	MMBtu	-
d. April	MMBtu	-
e. May	MMBtu	-
f. June	MMBtu	-
g. July	MMBtu	-
h. August	MMBtu	-
i. September	MMBtu	-
j. October	MMBtu	-
k. November	MMBtu	-
l. December	MMBtu	-
m. total	MMBtu	-
n. basic energy input	MMBtu	-
o. auxiliary energy input	MMBtu	-
p. fan energy input	MMBtu	-
23. DX Cooling Energy		
a. January	Ton-Hours	0
b. February	Ton-Hours	0
c. March	Ton-Hours	0
d. April	Ton-Hours	0
e. May	Ton-Hours	0
f. June	Ton-Hours	0
g. July	Ton-Hours	0
h. August	Ton-Hours	0
i. September	Ton-Hours	0
j. October	Ton-Hours	0
k. November	Ton-Hours	0
l. December	Ton-Hours	0
m. total	Ton-Hours	0
24. Furnace/HP Heating Energy		
a. January	MMBtu	-
b. February	MMBtu	-
c. March	MMBtu	-
d. April	MMBtu	-
e. May	MMBtu	-
f. June	MMBtu	-
g. July	MMBtu	-
h. August	MMBtu	-
i. September	MMBtu	-
j. October	MMBtu	-
k. November	MMBtu	-
l. December	MMBtu	-
m. Annual Load	MMBtu	-
n. Supplemental Load	MMBtu	-
o. Total Heat Load	MMBtu	0
p. Basic Energy Input	MMBtu	-
q. Auxiliary Energy Input	MMBtu	-

f. June	Ton	324.9203
g. July	Ton	361.4029
h. August	Ton	364.3136
i. September	Ton	291.7
j. October	Ton	276.201
k. November	Ton	159.2047
l. December	Ton	63.91775
22. DX Cooling Energy in MMBtu		
a. January	MMBtu	-
b. February	MMBtu	-
c. March	MMBtu	-
d. April	MMBtu	-
e. May	MMBtu	-
f. June	MMBtu	-
g. July	MMBtu	-
h. August	MMBtu	-
i. September	MMBtu	-
j. October	MMBtu	-
k. November	MMBtu	-
l. December	MMBtu	-
m. total	MMBtu	-
n. basic energy input	MMBtu	-
o. auxiliary energy input	MMBtu	-
p. fan energy input	MMBtu	-
23. DX Cooling Energy		
a. January	Ton-Hours	0
b. February	Ton-Hours	0
c. March	Ton-Hours	0
d. April	Ton-Hours	0
e. May	Ton-Hours	0
f. June	Ton-Hours	0
g. July	Ton-Hours	0
h. August	Ton-Hours	0
i. September	Ton-Hours	0
j. October	Ton-Hours	0
k. November	Ton-Hours	0
l. December	Ton-Hours	0
m. total	Ton-Hours	0
24. Furnace/HP Heating Energy		
a. January	MMBtu	-
b. February	MMBtu	-
c. March	MMBtu	-
d. April	MMBtu	-
e. May	MMBtu	-
f. June	MMBtu	-
g. July	MMBtu	-
h. August	MMBtu	-
i. September	MMBtu	-
j. October	MMBtu	-
k. November	MMBtu	-
l. December	MMBtu	-
m. Annual Load	MMBtu	-
n. Supplemental Load	MMBtu	-
o. Total Heat Load	MMBtu	0
p. Basic Energy Input	MMBtu	-
q. Auxiliary Energy Input	MMBtu	-

e. May	MMBtu	-5.760
f. June	MMBtu	-0.952
g. July	MMBtu	-0.170
h. August	MMBtu	-0.387
i. September	MMBtu	-1.907
j. October	MMBtu	-14.511
k. November	MMBtu	-70.682
l. December	MMBtu	-197.611
m. Annual	MMBtu	-936.669
n. Peak	kBtuh	-1867.241
o. Average	kBtuh	-264.3717
26. Peak Hot Water Use		
a. January	kBtuh	-1867.241
b. February	kBtuh	-1555.229
c. March	kBtuh	-1395.740
d. April	kBtuh	-642.116
e. May	kBtuh	-281.478
f. June	kBtuh	-131.546
g. July	kBtuh	-45.832
h. August	kBtuh	-78.739
i. September	kBtuh	-171.707
j. October	kBtuh	-434.999
k. November	kBtuh	-1125.262
l. December	kBtuh	-1606.700
27. Hourly Display Properties		
Date		Jul 27
Type		Cooling
28. Hourly Cooling Load		
1am	Btu	0
2am	Btu	860040
3am	Btu	0
4am	Btu	834698
5am	Btu	0
6am	Btu	806581
7am	Btu	0
8am	Btu	2223063
9am	Btu	2933620
10am	Btu	2784426
11am	Btu	2840839
noon	Btu	3428261
1pm	Btu	3726374
2pm	Btu	3746166
3pm	Btu	4483984
4pm	Btu	3673149
5pm	Btu	3314347
6pm	Btu	3654445
7pm	Btu	3817692
8pm	Btu	3812825
9pm	Btu	3417402
10pm	Btu	3378272
11pm	Btu	0
midnight	Btu	991543
29. Hourly Heating Load		
1am	Btu	21427
2am	Btu	21427
3am	Btu	21427

e. May	MMBtu	-4.401
f. June	MMBtu	-0.968
g. July	MMBtu	-0.299
h. August	MMBtu	-0.433
i. September	MMBtu	-1.752
j. October	MMBtu	-11.440
k. November	MMBtu	-65.719
l. December	MMBtu	-190.274
m. Annual	MMBtu	-893.552
n. Peak	kBtuh	-1829.965
o. Average	kBtuh	-253.6338
26. Peak Hot Water Use		
a. January	kBtuh	-1829.965
b. February	kBtuh	-1576.567
c. March	kBtuh	-1419.285
d. April	kBtuh	-647.438
e. May	kBtuh	-267.431
f. June	kBtuh	-130.719
g. July	kBtuh	-39.875
h. August	kBtuh	-76.223
i. September	kBtuh	-151.385
j. October	kBtuh	-431.014
k. November	kBtuh	-1105.873
l. December	kBtuh	-1581.316
27. Hourly Display Properties		
Date		Aug 9
Type		Cooling
28. Hourly Cooling Load		
1am	Btu	0
2am	Btu	889677
3am	Btu	0
4am	Btu	854429
5am	Btu	47241
6am	Btu	1252436
7am	Btu	1273016
8am	Btu	2062343
9am	Btu	1256988
10am	Btu	2137814
11am	Btu	1282620
noon	Btu	2231915
1pm	Btu	1321764
2pm	Btu	4220326
3pm	Btu	3341019
4pm	Btu	3257996
5pm	Btu	3733788
6pm	Btu	4371762
7pm	Btu	4242182
8pm	Btu	3944746
9pm	Btu	3466458
10pm	Btu	3007702
11pm	Btu	0
midnight	Btu	885696
29. Hourly Heating Load		
1am	Btu	21427
2am	Btu	21427
3am	Btu	21427

noon	Btu	3919466
1pm	Btu	4988547
2pm	Btu	5201442
3pm	Btu	6592384
4pm	Btu	5983072
5pm	Btu	4098048
6pm	Btu	4651382
7pm	Btu	5298883
8pm	Btu	5279560
9pm	Btu	4249380
10pm	Btu	3923634
11pm	Btu	83788
midnight	Btu	21427
30. Hourly Electric Load		
1am	kWh	6.966
2am	kWh	101.509
3am	kWh	6.966
4am	kWh	99.812
5am	kWh	6.966
6am	kWh	96.979
7am	kWh	6.966
8am	kWh	155.885
9am	kWh	209.048
10am	kWh	205.854
11am	kWh	208.338
noon	kWh	244.268
1pm	kWh	260.887
2pm	kWh	271.307
3pm	kWh	268.121
4pm	kWh	266.693
5pm	kWh	235.953
6pm	kWh	257.377
7pm	kWh	272.832
8pm	kWh	275.914
9pm	kWh	265.172
10pm	kWh	262.415
11pm	kWh	41.888
midnight	kWh	116.447
31. Load Duration Data		
a. peak values	kW / MMBtu /	292.14599609375 / 6.592384 / 373.6653333
b. 0 to 4%	hrs	7080 / 4968 / 5206
c. 4 to 8%	hrs	7016 / 2796 / 4554
d. 8 to 12%	hrs	6580 / 1738 / 3335
e. 12 to 16%	hrs	5919 / 1211 / 2738
f. 16 to 20%	hrs	5720 / 896 / 2231
g. 20 to 24%	hrs	5454 / 735 / 1922
h. 24 to 28%	hrs	4957 / 630 / 1691
i. 28 to 32%	hrs	4602 / 524 / 1508
j. 32 to 36%	hrs	4318 / 428 / 1332
k. 36 to 40%	hrs	4121 / 367 / 1147
l. 40 to 44%	hrs	3980 / 328 / 999
m. 44 to 48%	hrs	3712 / 279 / 870
n. 48 to 52%	hrs	3082 / 236 / 730
o. 52 to 56%	hrs	2746 / 210 / 606
p. 56 to 60%	hrs	2517 / 171 / 498
q. 60 to 64%	hrs	2278 / 148 / 406

noon	Btu	569674
1pm	Btu	467325
2pm	Btu	816398
3pm	Btu	531464
4pm	Btu	517338
5pm	Btu	664839
6pm	Btu	939422
7pm	Btu	936983
8pm	Btu	376724
9pm	Btu	333232
10pm	Btu	250084
11pm	Btu	83788
midnight	Btu	21427
30. Hourly Electric Load		
1am	kWh	6.966
2am	kWh	195.922
3am	kWh	6.966
4am	kWh	193.167
5am	kWh	72.297
6am	kWh	220.116
7am	kWh	289.398
8am	kWh	352.968
9am	kWh	298.157
10am	kWh	360.095
11am	kWh	302.263
noon	kWh	373.742
1pm	kWh	306.782
2pm	kWh	498.179
3pm	kWh	364.686
4pm	kWh	357.264
5pm	kWh	401.636
6pm	kWh	446.503
7pm	kWh	438.314
8pm	kWh	384.42
9pm	kWh	358.229
10pm	kWh	326.505
11pm	kWh	41.888
midnight	kWh	192.493
31. Load Duration Data		
a. peak values	kW / MMBtu /	505.039001464844 / 8.239059 / 364.3135
b. 0 to 4%	hrs	7376 / 5126 / 5038
c. 4 to 8%	hrs	7283 / 2277 / 4375
d. 8 to 12%	hrs	6500 / 1257 / 3400
e. 12 to 16%	hrs	6283 / 869 / 2817
f. 16 to 20%	hrs	6030 / 663 / 2304
g. 20 to 24%	hrs	5293 / 461 / 1970
h. 24 to 28%	hrs	5011 / 383 / 1720
i. 28 to 32%	hrs	4402 / 326 / 1528
j. 32 to 36%	hrs	3886 / 287 / 1358
k. 36 to 40%	hrs	3168 / 254 / 1172
l. 40 to 44%	hrs	2649 / 221 / 1006
m. 44 to 48%	hrs	2273 / 188 / 875
n. 48 to 52%	hrs	1807 / 143 / 744
o. 52 to 56%	hrs	1299 / 109 / 606
p. 56 to 60%	hrs	862 / 91 / 494
q. 60 to 64%	hrs	547 / 77 / 401

z. 96 to 100%	hrs	1 / 1 / 1
32. Selected Date Hourly Results		
a. peak day (Input 2.i)		Annual Peak Cooling Day
(1) midnight to 1:00 am	kW / kW / MM	7.0 / 0.0 / 0.0 / 0.0
(2) 1:00 am to 2:00 am	kW / kW / MM	101.5 / 0.0 / 0.0 / 0.0
(3) 2:00 am to 3:00 am	kW / kW / MM	7.0 / 0.0 / 0.0 / 0.0
(4) 3:00 am to 4:00 am	kW / kW / MM	99.8 / 0.0 / 0.0 / 0.0
(5) 4:00 am to 5:00 am	kW / kW / MM	7.0 / 0.0 / 0.0 / 0.0
(6) 5:00 am to 6:00 am	kW / kW / MM	97.0 / 0.0 / 0.0 / 0.0
(7) 6:00 am to 7:00 am	kW / kW / MM	7.0 / 0.0 / 0.0 / 0.0
(8) 7:00 am to 8:00 am	kW / kW / MM	155.9 / 0.0 / 1.5 / 0.0
(9) 8:00 am to 9:00 am	kW / kW / MM	209.0 / 0.0 / 2.8 / 0.0
(10) 9:00 am to 10:00 am	kW / kW / MM	205.9 / 0.0 / 2.5 / 0.0
(11) 10:00 am to 11:00 am	kW / kW / MM	208.3 / 0.0 / 2.6 / 0.0
(12) 11:00 am to noon	kW / kW / MM	244.3 / 0.0 / 3.9 / 0.0
(13) noon to 1:00 pm	kW / kW / MM	260.9 / 0.0 / 5.0 / 0.0
(14) 1:00 pm to 2:00 pm	kW / kW / MM	271.3 / 0.0 / 5.2 / 0.0
(15) 2:00 pm to 3:00 pm	kW / kW / MM	268.1 / 0.0 / 6.6 / 0.0
(16) 3:00 pm to 4:00 pm	kW / kW / MM	266.7 / 0.0 / 6.0 / 0.0
(17) 4:00 pm to 5:00 pm	kW / kW / MM	236.0 / 0.0 / 4.1 / 0.0
(18) 5:00 pm to 6:00 pm	kW / kW / MM	257.4 / 0.0 / 4.7 / 0.0
(19) 6:00 pm to 7:00 pm	kW / kW / MM	272.8 / 0.0 / 5.3 / 0.0
(20) 7:00 pm to 8:00 pm	kW / kW / MM	275.9 / 0.0 / 5.3 / 0.0
(21) 8:00 pm to 9:00 pm	kW / kW / MM	265.2 / 0.0 / 4.2 / 0.0
(22) 9:00 pm to 10:00 pm	kW / kW / MM	262.4 / 0.0 / 3.9 / 0.0
(23) 10:00 pm to 11:00 pm	kW / kW / MM	41.9 / 0.0 / 0.1 / 0.0
(24) 11:00 pm to midnight	kW / kW / MM	116.4 / 0.0 / 0.0 / 0.0
33. Mid-Winter Hourly Results		
a. February 2		Mid-Winter (February 2)
(1) midnight to 1:00 am	kW / kW / MM	29.4 / 0.0 / 0.1 / 0.0
(2) 1:00 am to 2:00 am	kW / kW / MM	38.6 / 0.0 / 0.1 / 0.0
(3) 2:00 am to 3:00 am	kW / kW / MM	41.4 / 0.0 / 0.1 / 0.0
(4) 3:00 am to 4:00 am	kW / kW / MM	38.6 / 0.0 / 0.1 / 0.0
(5) 4:00 am to 5:00 am	kW / kW / MM	51.9 / 0.0 / 0.1 / 0.0
(6) 5:00 am to 6:00 am	kW / kW / MM	39.8 / 0.0 / 0.3 / 0.0
(7) 6:00 am to 7:00 am	kW / kW / MM	70.4 / 0.0 / 1.2 / 0.0
(8) 7:00 am to 8:00 am	kW / kW / MM	-213.7 / 378.8 / 0.0 / 1.7
(9) 8:00 am to 9:00 am	kW / kW / MM	-143.8 / 304.4 / 0.1 / 1.4
(10) 9:00 am to 10:00 am	kW / kW / MM	-84.0 / 203.8 / 0.2 / 0.9
(11) 10:00 am to 11:00 am	kW / kW / MM	-62.9 / 213.1 / 0.2 / 1.0
(12) 11:00 am to noon	kW / kW / MM	-27.7 / 146.1 / 0.2 / 0.7
(13) noon to 1:00 pm	kW / kW / MM	-15.5 / 154.7 / 0.2 / 0.7
(14) 1:00 pm to 2:00 pm	kW / kW / MM	3.7 / 135.4 / 0.2 / 0.6
(15) 2:00 pm to 3:00 pm	kW / kW / MM	-17.2 / 223.5 / 0.2 / 1.0
(16) 3:00 pm to 4:00 pm	kW / kW / MM	37.5 / 84.1 / 0.2 / 0.4
(17) 4:00 pm to 5:00 pm	kW / kW / MM	25.7 / 94.1 / 0.2 / 0.4
(18) 5:00 pm to 6:00 pm	kW / kW / MM	25.8 / 149.8 / 0.2 / 0.7
(19) 6:00 pm to 7:00 pm	kW / kW / MM	-19.8 / 169.7 / 0.2 / 0.8
(20) 7:00 pm to 8:00 pm	kW / kW / MM	150.7 / 0.0 / 1.0 / 0.0
(21) 8:00 pm to 9:00 pm	kW / kW / MM	142.6 / 0.0 / 0.9 / 0.0
(22) 9:00 pm to 10:00 pm	kW / kW / MM	141.6 / 0.0 / 0.9 / 0.0
(23) 10:00 pm to 11:00 pm	kW / kW / MM	139.1 / 0.0 / 0.8 / 0.0
(24) 11:00 pm to midnight	kW / kW / MM	41.9 / 0.0 / 0.1 / 0.0
34. Mid-Spring Hourly Results		
a. May 6		Mid-Spring (May 6)
(1) midnight to 1:00 am	kW / kW / MM	7.0 / 0.0 / 0.0 / 0.0

z. 96 to 100%	hrs	1 / 1 / 1
32. Selected Date Hourly Results		
a. peak day (Input 2.i)		Annual Peak Cooling Day
(1) midnight to 1:00 am	kW / kW / MM	7.0 / 0.0 / 0.0 / 0.0
(2) 1:00 am to 2:00 am	kW / kW / MM	195.9 / 0.0 / 0.0 / 0.0
(3) 2:00 am to 3:00 am	kW / kW / MM	7.0 / 0.0 / 0.0 / 0.0
(4) 3:00 am to 4:00 am	kW / kW / MM	193.2 / 0.0 / 0.0 / 0.0
(5) 4:00 am to 5:00 am	kW / kW / MM	72.3 / 0.0 / 0.0 / 0.0
(6) 5:00 am to 6:00 am	kW / kW / MM	220.1 / 0.0 / 0.0 / 0.0
(7) 6:00 am to 7:00 am	kW / kW / MM	289.4 / 0.0 / 0.5 / 0.0
(8) 7:00 am to 8:00 am	kW / kW / MM	353.0 / 0.0 / 0.6 / 0.0
(9) 8:00 am to 9:00 am	kW / kW / MM	298.2 / 0.0 / 0.5 / 0.0
(10) 9:00 am to 10:00 am	kW / kW / MM	360.1 / 0.0 / 0.6 / 0.0
(11) 10:00 am to 11:00 am	kW / kW / MM	302.3 / 0.0 / 0.5 / 0.0
(12) 11:00 am to noon	kW / kW / MM	373.7 / 0.0 / 0.6 / 0.0
(13) noon to 1:00 pm	kW / kW / MM	306.8 / 0.0 / 0.5 / 0.0
(14) 1:00 pm to 2:00 pm	kW / kW / MM	498.2 / 0.0 / 0.8 / 0.0
(15) 2:00 pm to 3:00 pm	kW / kW / MM	364.7 / 0.0 / 0.5 / 0.0
(16) 3:00 pm to 4:00 pm	kW / kW / MM	357.3 / 0.0 / 0.5 / 0.0
(17) 4:00 pm to 5:00 pm	kW / kW / MM	401.6 / 0.0 / 0.7 / 0.0
(18) 5:00 pm to 6:00 pm	kW / kW / MM	446.5 / 0.0 / 0.9 / 0.0
(19) 6:00 pm to 7:00 pm	kW / kW / MM	438.3 / 0.0 / 0.9 / 0.0
(20) 7:00 pm to 8:00 pm	kW / kW / MM	384.4 / 0.0 / 0.4 / 0.0
(21) 8:00 pm to 9:00 pm	kW / kW / MM	358.2 / 0.0 / 0.3 / 0.0
(22) 9:00 pm to 10:00 pm	kW / kW / MM	326.5 / 0.0 / 0.3 / 0.0
(23) 10:00 pm to 11:00 pm	kW / kW / MM	41.9 / 0.0 / 0.1 / 0.0
(24) 11:00 pm to midnight	kW / kW / MM	192.5 / 0.0 / 0.0 / 0.0
33. Mid-Winter Hourly Results		
a. February 2		Mid-Winter (February 2)
(1) midnight to 1:00 am	kW / kW / MM	55.5 / 0.0 / 0.1 / 0.0
(2) 1:00 am to 2:00 am	kW / kW / MM	59.0 / 0.0 / 0.1 / 0.0
(3) 2:00 am to 3:00 am	kW / kW / MM	55.5 / 0.0 / 0.1 / 0.0
(4) 3:00 am to 4:00 am	kW / kW / MM	59.0 / 0.0 / 0.2 / 0.0
(5) 4:00 am to 5:00 am	kW / kW / MM	55.5 / 0.0 / 0.1 / 0.0
(6) 5:00 am to 6:00 am	kW / kW / MM	61.8 / 0.0 / 0.3 / 0.0
(7) 6:00 am to 7:00 am	kW / kW / MM	31.2 / 0.0 / 1.2 / 0.0
(8) 7:00 am to 8:00 am	kW / kW / MM	-66.8 / 189.4 / 0.7 / 0.9
(9) 8:00 am to 9:00 am	kW / kW / MM	0.6 / 158.2 / 0.7 / 0.7
(10) 9:00 am to 10:00 am	kW / kW / MM	119.7 / 0.0 / 1.1 / 0.0
(11) 10:00 am to 11:00 am	kW / kW / MM	118.9 / 0.0 / 1.0 / 0.0
(12) 11:00 am to noon	kW / kW / MM	150.0 / 0.0 / 1.0 / 0.0
(13) noon to 1:00 pm	kW / kW / MM	149.6 / 0.0 / 0.9 / 0.0
(14) 1:00 pm to 2:00 pm	kW / kW / MM	117.8 / 0.0 / 0.7 / 0.0
(15) 2:00 pm to 3:00 pm	kW / kW / MM	216.8 / 0.0 / 1.2 / 0.0
(16) 3:00 pm to 4:00 pm	kW / kW / MM	132.3 / 0.0 / 0.6 / 0.0
(17) 4:00 pm to 5:00 pm	kW / kW / MM	130.5 / 0.0 / 0.6 / 0.0
(18) 5:00 pm to 6:00 pm	kW / kW / MM	190.7 / 0.0 / 0.9 / 0.0
(19) 6:00 pm to 7:00 pm	kW / kW / MM	210.2 / 0.0 / 1.1 / 0.0
(20) 7:00 pm to 8:00 pm	kW / kW / MM	213.5 / 0.0 / 1.2 / 0.0
(21) 8:00 pm to 9:00 pm	kW / kW / MM	194.8 / 0.0 / 0.9 / 0.0
(22) 9:00 pm to 10:00 pm	kW / kW / MM	190.4 / 0.0 / 0.8 / 0.0
(23) 10:00 pm to 11:00 pm	kW / kW / MM	183.4 / 0.0 / 0.7 / 0.0
(24) 11:00 pm to midnight	kW / kW / MM	41.9 / 0.0 / 0.1 / 0.0
34. Mid-Spring Hourly Results		
a. May 6		Mid-Spring (May 6)
(1) midnight to 1:00 am	kW / kW / MM	7.0 / 0.0 / 0.0 / 0.0

(10) 9:00 am to 10:00 am	kW / kW / MM	203.1 / 0.0 / 0.4 / 0.0
(11) 10:00 am to 11:00 am	kW / kW / MM	141.5 / 0.0 / 0.3 / 0.0
(12) 11:00 am to noon	kW / kW / MM	240.4 / 0.0 / 0.5 / 0.0
(13) noon to 1:00 pm	kW / kW / MM	162.8 / 0.0 / 0.4 / 0.0
(14) 1:00 pm to 2:00 pm	kW / kW / MM	204.7 / 71.7 / 0.2 / 0.3
(15) 2:00 pm to 3:00 pm	kW / kW / MM	190.9 / 0.0 / 0.3 / 0.0
(16) 3:00 pm to 4:00 pm	kW / kW / MM	138.8 / 0.0 / 0.1 / 0.0
(17) 4:00 pm to 5:00 pm	kW / kW / MM	164.5 / 0.0 / 0.2 / 0.0
(18) 5:00 pm to 6:00 pm	kW / kW / MM	176.2 / 0.0 / 0.4 / 0.0
(19) 6:00 pm to 7:00 pm	kW / kW / MM	177.4 / 0.0 / 0.4 / 0.0
(20) 7:00 pm to 8:00 pm	kW / kW / MM	169.3 / 0.0 / 0.4 / 0.0
(21) 8:00 pm to 9:00 pm	kW / kW / MM	166.2 / 0.0 / 0.3 / 0.0
(22) 9:00 pm to 10:00 pm	kW / kW / MM	157.9 / 0.0 / 0.3 / 0.0
(23) 10:00 pm to 11:00 pm	kW / kW / MM	41.9 / 0.0 / 0.1 / 0.0
(24) 11:00 pm to midnight	kW / kW / MM	74.3 / 0.0 / 0.0 / 0.0
35. Mid-Summer Hourly Results		
a. August 6		Mid-Summer (August 6)
(1) midnight to 1:00 am	kW / kW / MM	7.0 / 0.0 / 0.0 / 0.0
(2) 1:00 am to 2:00 am	kW / kW / MM	93.6 / 0.0 / 0.0 / 0.0
(3) 2:00 am to 3:00 am	kW / kW / MM	7.0 / 0.0 / 0.0 / 0.0
(4) 3:00 am to 4:00 am	kW / kW / MM	90.7 / 0.0 / 0.0 / 0.0
(5) 4:00 am to 5:00 am	kW / kW / MM	36.7 / 0.0 / 0.0 / 0.0
(6) 5:00 am to 6:00 am	kW / kW / MM	127.8 / 0.0 / 0.0 / 0.0
(7) 6:00 am to 7:00 am	kW / kW / MM	221.9 / 0.0 / 0.4 / 0.0
(8) 7:00 am to 8:00 am	kW / kW / MM	230.1 / 55.5 / 0.3 / 0.3
(9) 8:00 am to 9:00 am	kW / kW / MM	223.7 / 0.0 / 0.4 / 0.0
(10) 9:00 am to 10:00 am	kW / kW / MM	229.2 / 56.8 / 0.3 / 0.3
(11) 10:00 am to 11:00 am	kW / kW / MM	224.6 / 0.0 / 0.4 / 0.0
(12) 11:00 am to noon	kW / kW / MM	230.3 / 57.7 / 0.3 / 0.3
(13) noon to 1:00 pm	kW / kW / MM	225.1 / 0.0 / 0.4 / 0.0
(14) 1:00 pm to 2:00 pm	kW / kW / MM	265.7 / 169.9 / 0.2 / 0.8
(15) 2:00 pm to 3:00 pm	kW / kW / MM	270.9 / 0.0 / 0.5 / 0.0
(16) 3:00 pm to 4:00 pm	kW / kW / MM	219.6 / 0.0 / 2.0 / 0.0
(17) 4:00 pm to 5:00 pm	kW / kW / MM	249.0 / 0.0 / 3.0 / 0.0
(18) 5:00 pm to 6:00 pm	kW / kW / MM	265.6 / 0.0 / 4.0 / 0.0
(19) 6:00 pm to 7:00 pm	kW / kW / MM	266.4 / 0.0 / 3.9 / 0.0
(20) 7:00 pm to 8:00 pm	kW / kW / MM	256.0 / 0.0 / 3.6 / 0.0
(21) 8:00 pm to 9:00 pm	kW / kW / MM	248.8 / 0.0 / 3.2 / 0.0
(22) 9:00 pm to 10:00 pm	kW / kW / MM	238.8 / 0.0 / 2.6 / 0.0
(23) 10:00 pm to 11:00 pm	kW / kW / MM	41.9 / 0.0 / 0.1 / 0.0
(24) 11:00 pm to midnight	kW / kW / MM	97.2 / 0.0 / 0.0 / 0.0
36. Mid-Fall Hourly Results		
a. November 6		Mid-Fall (November 6)
(1) midnight to 1:00 am	kW / kW / MM	81.8 / 0.0 / 0.0 / 0.0
(2) 1:00 am to 2:00 am	kW / kW / MM	7.0 / 0.0 / 0.0 / 0.0
(3) 2:00 am to 3:00 am	kW / kW / MM	79.8 / 0.0 / 0.0 / 0.0
(4) 3:00 am to 4:00 am	kW / kW / MM	7.0 / 0.0 / 0.0 / 0.0
(5) 4:00 am to 5:00 am	kW / kW / MM	78.6 / 0.0 / 0.0 / 0.0
(6) 5:00 am to 6:00 am	kW / kW / MM	7.0 / 0.0 / 0.0 / 0.0
(7) 6:00 am to 7:00 am	kW / kW / MM	102.3 / 0.0 / 0.1 / 0.0
(8) 7:00 am to 8:00 am	kW / kW / MM	191.4 / 0.0 / 0.4 / 0.0
(9) 8:00 am to 9:00 am	kW / kW / MM	238.7 / 0.0 / 0.5 / 0.0
(10) 9:00 am to 10:00 am	kW / kW / MM	202.7 / 0.0 / 0.4 / 0.0
(11) 10:00 am to 11:00 am	kW / kW / MM	239.2 / 0.0 / 0.5 / 0.0
(12) 11:00 am to noon	kW / kW / MM	204.5 / 0.0 / 0.4 / 0.0
(13) noon to 1:00 pm	kW / kW / MM	240.1 / 0.0 / 0.5 / 0.0

(10) 9:00 am to 10:00 am	kW / kW / MM	213.4 / 0.0 / 0.4 / 0.0
(11) 10:00 am to 11:00 am	kW / kW / MM	154.0 / 0.0 / 0.3 / 0.0
(12) 11:00 am to noon	kW / kW / MM	268.0 / 0.0 / 0.4 / 0.0
(13) noon to 1:00 pm	kW / kW / MM	154.4 / 0.0 / 0.3 / 0.0
(14) 1:00 pm to 2:00 pm	kW / kW / MM	336.8 / 0.0 / 0.6 / 0.0
(15) 2:00 pm to 3:00 pm	kW / kW / MM	258.5 / 0.0 / 0.4 / 0.0
(16) 3:00 pm to 4:00 pm	kW / kW / MM	248.1 / 0.0 / 0.4 / 0.0
(17) 4:00 pm to 5:00 pm	kW / kW / MM	279.0 / 0.0 / 0.5 / 0.0
(18) 5:00 pm to 6:00 pm	kW / kW / MM	287.2 / 0.0 / 0.7 / 0.0
(19) 6:00 pm to 7:00 pm	kW / kW / MM	288.0 / 0.0 / 0.7 / 0.0
(20) 7:00 pm to 8:00 pm	kW / kW / MM	250.0 / 0.0 / 0.4 / 0.0
(21) 8:00 pm to 9:00 pm	kW / kW / MM	247.5 / 0.0 / 0.3 / 0.0
(22) 9:00 pm to 10:00 pm	kW / kW / MM	244.6 / 0.0 / 0.3 / 0.0
(23) 10:00 pm to 11:00 pm	kW / kW / MM	41.9 / 0.0 / 0.1 / 0.0
(24) 11:00 pm to midnight	kW / kW / MM	151.9 / 0.0 / 0.0 / 0.0
35. Mid-Summer Hourly Results		
a. August 6		Mid-Summer (August 6)
(1) midnight to 1:00 am	kW / kW / MM	7.0 / 0.0 / 0.0 / 0.0
(2) 1:00 am to 2:00 am	kW / kW / MM	184.9 / 0.0 / 0.0 / 0.0
(3) 2:00 am to 3:00 am	kW / kW / MM	7.0 / 0.0 / 0.0 / 0.0
(4) 3:00 am to 4:00 am	kW / kW / MM	182.7 / 0.0 / 0.0 / 0.0
(5) 4:00 am to 5:00 am	kW / kW / MM	65.5 / 0.0 / 0.0 / 0.0
(6) 5:00 am to 6:00 am	kW / kW / MM	207.4 / 0.0 / 0.0 / 0.0
(7) 6:00 am to 7:00 am	kW / kW / MM	281.2 / 0.0 / 0.4 / 0.0
(8) 7:00 am to 8:00 am	kW / kW / MM	326.5 / 0.0 / 0.5 / 0.0
(9) 8:00 am to 9:00 am	kW / kW / MM	282.6 / 0.0 / 0.5 / 0.0
(10) 9:00 am to 10:00 am	kW / kW / MM	327.0 / 0.0 / 0.5 / 0.0
(11) 10:00 am to 11:00 am	kW / kW / MM	281.1 / 0.0 / 0.5 / 0.0
(12) 11:00 am to noon	kW / kW / MM	326.7 / 0.0 / 0.5 / 0.0
(13) noon to 1:00 pm	kW / kW / MM	280.6 / 0.0 / 0.5 / 0.0
(14) 1:00 pm to 2:00 pm	kW / kW / MM	413.9 / 0.0 / 0.7 / 0.0
(15) 2:00 pm to 3:00 pm	kW / kW / MM	292.7 / 0.0 / 0.5 / 0.0
(16) 3:00 pm to 4:00 pm	kW / kW / MM	288.5 / 0.0 / 0.5 / 0.0
(17) 4:00 pm to 5:00 pm	kW / kW / MM	333.3 / 0.0 / 0.6 / 0.0
(18) 5:00 pm to 6:00 pm	kW / kW / MM	362.7 / 0.0 / 0.9 / 0.0
(19) 6:00 pm to 7:00 pm	kW / kW / MM	362.9 / 0.0 / 0.9 / 0.0
(20) 7:00 pm to 8:00 pm	kW / kW / MM	338.2 / 0.0 / 0.4 / 0.0
(21) 8:00 pm to 9:00 pm	kW / kW / MM	324.6 / 0.0 / 0.3 / 0.0
(22) 9:00 pm to 10:00 pm	kW / kW / MM	307.7 / 0.0 / 0.3 / 0.0
(23) 10:00 pm to 11:00 pm	kW / kW / MM	41.9 / 0.0 / 0.1 / 0.0
(24) 11:00 pm to midnight	kW / kW / MM	188.2 / 0.0 / 0.0 / 0.0
36. Mid-Fall Hourly Results		
a. November 6		Mid-Fall (November 6)
(1) midnight to 1:00 am	kW / kW / MM	175.2 / 0.0 / 0.0 / 0.0
(2) 1:00 am to 2:00 am	kW / kW / MM	7.0 / 0.0 / 0.0 / 0.0
(3) 2:00 am to 3:00 am	kW / kW / MM	169.9 / 0.0 / 0.0 / 0.0
(4) 3:00 am to 4:00 am	kW / kW / MM	7.0 / 0.0 / 0.0 / 0.0
(5) 4:00 am to 5:00 am	kW / kW / MM	164.9 / 0.0 / 0.0 / 0.0
(6) 5:00 am to 6:00 am	kW / kW / MM	7.0 / 0.0 / 0.0 / 0.0
(7) 6:00 am to 7:00 am	kW / kW / MM	194.3 / 0.0 / 0.1 / 0.0
(8) 7:00 am to 8:00 am	kW / kW / MM	211.3 / 0.0 / 0.4 / 0.0
(9) 8:00 am to 9:00 am	kW / kW / MM	303.3 / 0.0 / 0.5 / 0.0
(10) 9:00 am to 10:00 am	kW / kW / MM	223.9 / 0.0 / 0.4 / 0.0
(11) 10:00 am to 11:00 am	kW / kW / MM	303.9 / 0.0 / 0.5 / 0.0
(12) 11:00 am to noon	kW / kW / MM	228.1 / 0.0 / 0.4 / 0.0
(13) noon to 1:00 pm	kW / kW / MM	304.8 / 0.0 / 0.5 / 0.0

(22) 9:00 pm to 10:00 pm	kW / kW / MM	188.2 / 0.0 / 0.3 / 0.0
(23) 10:00 pm to 11:00 pm	kW / kW / MM	180.6 / 0.0 / 0.3 / 0.0
(24) 11:00 pm to midnight	kW / kW / MM	41.9 / 0.0 / 0.1 / 0.0
36. Load Satsified		
a. Chillers	%	100.0
b. Boilers	%	100.0
c. Electric	%	100.0
37. Plant Equipment Sizes in MMBtuh		
a. Boiler	MMBtuh	6.500
b. Lead Elec Chiller	MMBtuh	
c. Lag Elec Chiller	MMBtuh	1.349
d. Lead Steam Absorber	MMBtuh	2.505
e. Lag Steam Absorber	MMBtuh	
f. Gas Absorber	MMBtuh	
g. Engine Chlr	MMBtuh	
h. Storage Chiller	MMBtuh	
i. Cooling Tower	MMBtuh	4.064
j. Generator	MMBtuh	1.175
k. Cool Storage	MMBtu	
l. Heat Storage	MMBtu	
38. Plant Equipment Sizes		
a. Boiler	Boil HP	194.1516
b. Lead Elec Chiller	ton	0
c. Lag Elec Chiller	ton	112.4167
d. Lead Steam Absorber	ton	208.75
e. Lag Steam Absorber	ton	0
f. Gas Absorber	ton	0
g. Engine Chlr	ton	0
h. Storage Chiller	ton	0
i. Cooling Tower	ton	338.6667
j. Generator	kW	344.2719
k. Cool Storage	ton-hr	0
l. Heat Storage	ton-hr	0
39. Packaged Cooling Sizes in Btuh		
a. North East Perimeter	kBtuh	-
b. North East Core	kBtuh	-
c. North Central Perimeter	kBtuh	-
d. North Central Core	kBtuh	-
e. North West Perimeter	kBtuh	-
f. North West Core	kBtuh	-
g. South East Perimeter	kBtuh	-
h. South East Core	kBtuh	-
i. South Central Perimeter	kBtuh	-
j. South Central Core	kBtuh	-
k. South West Perimeter	kBtuh	-
l. South West Core	kBtuh	-
m. Total	kBtuh	0
40. Packaged Heating Sizes		
a. North East Perimeter	kBtuh	-
b. North East Core	kBtuh	-
c. North Central Perimeter	kBtuh	-
d. North Central Core	kBtuh	-
e. North West Perimeter	kBtuh	-
f. North West Core	kBtuh	-
g. South East Perimeter	kBtuh	-
h. South East Core	kBtuh	-

(22) 9:00 pm to 10:00 pm	kW / kW / MM	253.7 / 0.0 / 0.3 / 0.0
(23) 10:00 pm to 11:00 pm	kW / kW / MM	250.5 / 0.0 / 0.3 / 0.0
(24) 11:00 pm to midnight	kW / kW / MM	41.9 / 0.0 / 0.1 / 0.0
36. Load Satsified		
a. Chillers	%	100.0
b. Boilers	%	100.0
c. Electric	%	100.0
37. Plant Equipment Sizes in MMBtuh		
a. Boiler	MMBtuh	20.087
b. Lead Elec Chiller	MMBtuh	
c. Lag Elec Chiller	MMBtuh	6.600
d. Lead Steam Absorber	MMBtuh	4.800
e. Lag Steam Absorber	MMBtuh	
f. Gas Absorber	MMBtuh	
g. Engine Chlr	MMBtuh	
h. Storage Chiller	MMBtuh	
i. Cooling Tower	MMBtuh	10.141
j. Generator	MMBtuh	3.140
k. Cool Storage	MMBtu	
l. Heat Storage	MMBtu	
38. Plant Equipment Sizes		
a. Boiler	Boil HP	599.988
b. Lead Elec Chiller	ton	0
c. Lag Elec Chiller	ton	550
d. Lead Steam Absorber	ton	400
e. Lag Steam Absorber	ton	0
f. Gas Absorber	ton	0
g. Engine Chlr	ton	0
h. Storage Chiller	ton	0
i. Cooling Tower	ton	845.0833
j. Generator	kW	920.0118
k. Cool Storage	ton-hr	0
l. Heat Storage	ton-hr	0
39. Packaged Cooling Sizes in Btuh		
a. North East Perimeter	kBtuh	-
b. North East Core	kBtuh	-
c. North Central Perimeter	kBtuh	-
d. North Central Core	kBtuh	-
e. North West Perimeter	kBtuh	-
f. North West Core	kBtuh	-
g. South East Perimeter	kBtuh	-
h. South East Core	kBtuh	-
i. South Central Perimeter	kBtuh	-
j. South Central Core	kBtuh	-
k. South West Perimeter	kBtuh	-
l. South West Core	kBtuh	-
m. Total	kBtuh	0
40. Packaged Heating Sizes		
a. North East Perimeter	kBtuh	-
b. North East Core	kBtuh	-
c. North Central Perimeter	kBtuh	-
d. North Central Core	kBtuh	-
e. North West Perimeter	kBtuh	-
f. North West Core	kBtuh	-
g. South East Perimeter	kBtuh	-
h. South East Core	kBtuh	-

c. Equip Cost	dollar/HP	206.67
d. Installed Cost	dollar/HP	234.58
e. Service Life	Years	30
f. Repair Cost	dollar/HP	.17
g. Maintenance Cost	dollar/HP	.12
42. Chiller Unit Costs		
a. Lead Type		IFSE Absorption Chiller
b. Lead Labor Cost	dollar/ton	90
c. Lead Equip Cost	dollar/ton	500
d. Lead Installed Cost	dollar/ton	590
e. Lead Service Life	Years	20
f. Lead Repair Cost	dollar/ton	34.6
g. Lead Maintenance Cost	dollar/ton	1.12
h. Lag Type		Water-Cooled
i. Lag Labor Cost	dollar/ton	28.67
j. Lag Equip Cost	dollar/ton	407.81
k. Lag Installed Cost	dollar/ton	436.48
l. Lag Service Life	Years	20
m. Lag Repair Cost	dollar/ton	32.67
n. Lag Maintenance Cost	dollar/ton	2.9
43. Desiccant Unit Costs		
a. Type		0
b. Labor Cost	dollar/cfm	0
c. Equip Cost	dollar/cfm	0
d. Installed Cost	dollar/cfm	0
e. Service Life	Years	0
f. Repair Cost	dollar/cfm	0
g. Maintenance Cost	dollar/cfm	0
44. Cooling Tower Unit Costs		
a. Type		TwoSpeed
b. Labor Cost	dollar/ton	70
c. Equip Cost	dollar/ton	176
d. Installed Cost	dollar/ton	246
e. Service Life	Years	15
f. Repair Cost	dollar/ton	2.145
g. Maintenance Cost	dollar/ton	2.73
45. Cool Storage Unit Costs		
a. Type		None
b. Labor Cost	dollar/ton-hr	0
c. Equip Cost	dollar/ton-hr	0
d. Installed Cost	dollar/ton-hr	0
e. Service Life	Years	0
f. Repair Cost	dollar/ton-hr	0
g. Maintenance Cost	dollar/ton-hr	0
46. Hot Storage Unit Costs		
a. Type		
b. Labor Cost	dollar/ton-hr	0
c. Equip Cost	dollar/ton-hr	0
d. Installed Cost	dollar/ton-hr	0
e. Service Life	Years	0
f. Repair Cost	dollar/ton-hr	0
g. Maintenance Cost	dollar/ton-hr	0
47. Generator Unit Costs		
a. Type		ICE
b. Labor Cost	dollar/kW	500
c. Equip Cost	dollar/kW	355

c. Equip Cost	dollar/HP	292
d. Installed Cost	dollar/HP	342.75
e. Service Life	Years	30
f. Repair Cost	dollar/HP	.26
g. Maintenance Cost	dollar/HP	.35
42. Chiller Unit Costs		
a. Lead Type		IFSE Absorption Chiller
b. Lead Labor Cost	dollar/ton	90
c. Lead Equip Cost	dollar/ton	500
d. Lead Installed Cost	dollar/ton	590
e. Lead Service Life	Years	20
f. Lead Repair Cost	dollar/ton	34.6
g. Lead Maintenance Cost	dollar/ton	1.12
h. Lag Type		Water-Cooled
i. Lag Labor Cost	dollar/ton	28.67
j. Lag Equip Cost	dollar/ton	407.81
k. Lag Installed Cost	dollar/ton	436.48
l. Lag Service Life	Years	20
m. Lag Repair Cost	dollar/ton	32.67
n. Lag Maintenance Cost	dollar/ton	2.9
43. Desiccant Unit Costs		
a. Type		0
b. Labor Cost	dollar/cfm	0
c. Equip Cost	dollar/cfm	0
d. Installed Cost	dollar/cfm	0
e. Service Life	Years	0
f. Repair Cost	dollar/cfm	0
g. Maintenance Cost	dollar/cfm	0
44. Cooling Tower Unit Costs		
a. Type		TwoSpeed
b. Labor Cost	dollar/ton	70
c. Equip Cost	dollar/ton	176
d. Installed Cost	dollar/ton	246
e. Service Life	Years	15
f. Repair Cost	dollar/ton	2.145
g. Maintenance Cost	dollar/ton	2.73
45. Cool Storage Unit Costs		
a. Type		None
b. Labor Cost	dollar/ton-hr	0
c. Equip Cost	dollar/ton-hr	0
d. Installed Cost	dollar/ton-hr	0
e. Service Life	Years	0
f. Repair Cost	dollar/ton-hr	0
g. Maintenance Cost	dollar/ton-hr	0
46. Hot Storage Unit Costs		
a. Type		
b. Labor Cost	dollar/ton-hr	0
c. Equip Cost	dollar/ton-hr	0
d. Installed Cost	dollar/ton-hr	0
e. Service Life	Years	0
f. Repair Cost	dollar/ton-hr	0
g. Maintenance Cost	dollar/ton-hr	0
47. Generator Unit Costs		
a. Type		ICE
b. Labor Cost	dollar/kW	500
c. Equip Cost	dollar/kW	355

e. Cooling Tower	dollar	59605.34
f. Cool Storage	dollar	0
g. Heat Storage	dollar	0
h. Generator	dollar	122216.5
i. Total	dollar	372166.8
j. Cost Premium	dollar	0
49. Equipment Installed Costs		
a. Lead Chiller	dollar	123162.5
b. Lag Chiller	dollar	49067.64
c. Boiler	dollar	45544.08
d. Desiccant	dollar	0
e. Cooling Tower	dollar	83312.01
f. Cool Storage	dollar	0
g. Heat Storage	dollar	0
h. Generator	dollar	294352.5
i. Total	dollar	595438.8
j. Cost Premium	dollar	0
50. Maintenance Costs		
a. Lead Chiller	dollar	233.8
b. Lag Chiller	dollar	326.0085
c. Boiler	dollar	23.29819
d. Desiccant	dollar	0
e. Cooling Tower	dollar	924.5601
f. Cool Storage	dollar	0
g. Heat Storage	dollar	0
h. Generator	dollar	1847.969
i. Total	dollar	3355.636
j. Cost Premium	dollar	0
51. Repair Costs		
a. Lead Chiller	dollar	7222.75
b. Lag Chiller	dollar	3672.654
c. Boiler	dollar	33.00577
d. Desiccant	dollar	0
e. Cooling Tower	dollar	726.4401
f. Cool Storage	dollar	0
g. Heat Storage	dollar	0
i. Total	dollar	11654.85
j. Cost Premium	dollar	0
52. Standard Electric Costs		
a. Rate Used Name	dollars	Rate 30 - Utility Supplier
b. Qualifies	dollars	Yes
c. Energy Provided	kWh	1001231.41
d. Service Charges	dollars	232.44
e. Cost of All Blocks	dollars	98794.83
f. Energy Cost Adjustment	dollars	2733.36
g. SubTotal	dollars	101760.64
h. Tax Cost - Per Unit	dollars	0
i. Tax Cost - Percent	dollars	6105.64
j. Total	dollars	107866.27
53. Monthly Standard Electric Costs		
a. January	dollars	5729.69
b. February	dollars	5236.84
c. March	dollars	6878.85
d. April	dollars	8500.77
e. May	dollars	10558.7
f. June	dollars	11498.57

e. Cooling Tower	dollar	148734.7
f. Cool Storage	dollar	0
g. Heat Storage	dollar	0
h. Generator	dollar	326604.2
i. Total	dollar	1074831
j. Cost Premium	dollar	702664.2
49. Equipment Installed Costs		
a. Lead Chiller	dollar	236000
b. Lag Chiller	dollar	240064
c. Boiler	dollar	205645.9
d. Desiccant	dollar	0
e. Cooling Tower	dollar	207890.5
f. Cool Storage	dollar	0
g. Heat Storage	dollar	0
h. Generator	dollar	786610.1
i. Total	dollar	1676211
j. Cost Premium	dollar	1080772
50. Maintenance Costs		
a. Lead Chiller	dollar	448
b. Lag Chiller	dollar	1595
c. Boiler	dollar	209.9958
d. Desiccant	dollar	0
e. Cooling Tower	dollar	2307.077
f. Cool Storage	dollar	0
g. Heat Storage	dollar	0
h. Generator	dollar	89.5653
i. Total	dollar	4649.638
j. Cost Premium	dollar	1294.002
51. Repair Costs		
a. Lead Chiller	dollar	13840
b. Lag Chiller	dollar	17968.5
c. Boiler	dollar	155.9969
d. Desiccant	dollar	0
e. Cooling Tower	dollar	1812.704
f. Cool Storage	dollar	0
g. Heat Storage	dollar	0
i. Total	dollar	33777.2
j. Cost Premium	dollar	22122.35
52. Standard Electric Costs		
a. Rate Used Name	dollars	Rate 30 - Utility Supplier
b. Qualifies	dollars	Yes
c. Energy Provided	kWh	1406905.74
d. Service Charges	dollars	232.44
e. Cost of All Blocks	dollars	144838.92
f. Energy Cost Adjustment	dollars	3840.85
g. SubTotal	dollars	148912.21
h. Tax Cost - Per Unit	dollars	0
i. Tax Cost - Percent	dollars	8934.73
j. Total	dollars	157846.94
53. Monthly Standard Electric Costs		
a. January	dollars	9469.61
b. February	dollars	8590.5
c. March	dollars	10627.95
d. April	dollars	12044.73
e. May	dollars	14423.2
f. June	dollars	16196.98

b. Qualifies	dollars	
c. Service Charges	dollars	
d. Cost of All Blocks	dollars	
e. Energy Cost Adjustment	dollars	
f. SubTotal	dollars	
g. Tax Cost - Per Unit	dollars	
h. Tax Cost - Percent	dollars	
i. Total	dollars	
55. Monthly Elec Sell Credit		
a. January	dollars	
b. February	dollars	
c. March	dollars	
d. April	dollars	
e. May	dollars	
f. June	dollars	
g. July	dollars	
h. August	dollars	
i. September	dollars	
j. October	dollars	
k. November	dollars	
l. December	dollars	
56. Standard Gas Costs		
a. Rate Used Name	dollars	SGS
b. Qualifies	dollars	Yes
c. Service Charges	dollars	240
d. Cost of All Blocks	dollars	59908.94
e. Energy Cost Adjustment	dollars	15722.27
f. SubTotal	dollars	75871.21
g. Tax Cost - Per Unit	dollars	0
h. Tax Cost - Percent	dollars	0
i. Total	dollars	75871.21
57. Monthly Standard Gas Costs		
a. January	dollars	7147.22
b. February	dollars	6453.98
c. March	dollars	4790.12
d. April	dollars	2887.87
e. May	dollars	3674.21
f. June	dollars	7225.48
g. July	dollars	11402.15
h. August	dollars	12402.13
i. September	dollars	5894.75
j. October	dollars	4110.83
k. November	dollars	3757.78
l. December	dollars	6124.68
58. Gas Cooling Costs		
a. Rate Used Name	dollars	SGS
b. Qualifies	dollars	Yes
c. Service Charges	dollars	240
d. Cost of All Blocks	dollars	101950.13
e. Energy Cost Adjustment	dollars	27631.61
f. SubTotal	dollars	129821.74
g. Tax Cost - Per Unit	dollars	0
h. Tax Cost - Percent	dollars	0
i. Total	dollars	129821.74
59. Monthly Gas Cooling Costs		
a. January	dollars	3758.59

b. Qualifies	dollars	
c. Service Charges	dollars	
d. Cost of All Blocks	dollars	
e. Energy Cost Adjustment	dollars	
f. SubTotal	dollars	
g. Tax Cost - Per Unit	dollars	
h. Tax Cost - Percent	dollars	
i. Total	dollars	
55. Monthly Elec Sell Credit		
a. January	dollars	
b. February	dollars	
c. March	dollars	
d. April	dollars	
e. May	dollars	
f. June	dollars	
g. July	dollars	
h. August	dollars	
i. September	dollars	
j. October	dollars	
k. November	dollars	
l. December	dollars	
56. Standard Gas Costs		
a. Rate Used Name	dollars	SGS
b. Qualifies	dollars	Yes
c. Service Charges	dollars	240
d. Cost of All Blocks	dollars	87172.71
e. Energy Cost Adjustment	dollars	23319.99
f. SubTotal	dollars	110732.69
g. Tax Cost - Per Unit	dollars	0
h. Tax Cost - Percent	dollars	0
i. Total	dollars	110732.69
57. Monthly Standard Gas Costs		
a. January	dollars	9732.43
b. February	dollars	8839.11
c. March	dollars	8296.02
d. April	dollars	7234.89
e. May	dollars	8262.1
f. June	dollars	10420.33
g. July	dollars	11101.7
h. August	dollars	12011.76
i. September	dollars	9798.68
j. October	dollars	8164.48
k. November	dollars	7867.47
l. December	dollars	9003.73
58. Gas Cooling Costs		
a. Rate Used Name	dollars	
b. Qualifies	dollars	
c. Service Charges	dollars	
d. Cost of All Blocks	dollars	
e. Energy Cost Adjustment	dollars	
f. SubTotal	dollars	
g. Tax Cost - Per Unit	dollars	
h. Tax Cost - Percent	dollars	
i. Total	dollars	
59. Monthly Gas Cooling Costs		
a. January	dollars	

j. October	dollars	11564.19
k. November	dollars	6677.25
l. December	dollars	4037.27
60. Total Electric Utility Costs		
a. Service Charges	dollars	232.44
b. Cost of All Blocks	dollars	98794.83
c. Energy Cost Adjustment	dollars	2733.36
d. SubTotal	dollars	101760.6
e. Tax Cost - Per Unit	dollars	0
f. Tax Cost - Percent	dollars	6105.64
g. Total	dollars	107866.3
61. Total Monthly Electric Costs		
a. January	dollars	5729.69
b. February	dollars	5236.84
c. March	dollars	6878.85
d. April	dollars	8500.77
e. May	dollars	10558.7
f. June	dollars	11498.57
g. July	dollars	12114.29
h. August	dollars	12332.21
i. September	dollars	10809.03
j. October	dollars	10203.1
k. November	dollars	7958.81
l. December	dollars	6045.42
62. Total Gas Utility Costs		
a. Service Charges	dollars	480
b. Cost of All Blocks	dollars	161859.1
c. Energy Cost Adjustment	dollars	43353.88
d. SubTotal	dollars	205693
e. Tax Cost - Per Unit	dollars	0
f. Tax Cost - Percent	dollars	0
g. Total	dollars	205693
63. Total Monthly Gas Costs		
a. January	dollars	10905.81
b. February	dollars	9933.78
c. March	dollars	9585.471
d. April	dollars	9466.92
e. May	dollars	15280.69
f. June	dollars	24551.67
g. July	dollars	33573.56
h. August	dollars	34867.29
i. September	dollars	21255.75
j. October	dollars	15675.02
k. November	dollars	10435.03
l. December	dollars	10161.95
64. Total Utility Costs		
a. Service Charges	dollars	712.44
b. Cost of All Blocks	dollars	260653.9
c. Energy Cost Adjustment	dollars	46087.24
d. SubTotal	dollars	307453.6
e. Tax Cost - Per Unit	dollars	0
f. Tax Cost - Percent	dollars	6105.64
g. Total	dollars	313559.3
65. Total Monthly Utility Costs		
a. January	dollars	16635.5
b. February	dollars	15170.62

j. October	dollars	
k. November	dollars	
l. December	dollars	
60. Total Electric Utility Costs		
a. Service Charges	dollars	232.44
b. Cost of All Blocks	dollars	144838.9
c. Energy Cost Adjustment	dollars	3840.85
d. SubTotal	dollars	148912.2
e. Tax Cost - Per Unit	dollars	0
f. Tax Cost - Percent	dollars	8934.73
g. Total	dollars	157846.9
61. Total Monthly Electric Costs		
a. January	dollars	9469.61
b. February	dollars	8590.5
c. March	dollars	10627.95
d. April	dollars	12044.73
e. May	dollars	14423.2
f. June	dollars	16196.98
g. July	dollars	18015.15
h. August	dollars	18106.78
i. September	dollars	15133.52
j. October	dollars	14220.62
k. November	dollars	11347.11
l. December	dollars	9670.8
62. Total Gas Utility Costs		
a. Service Charges	dollars	240
b. Cost of All Blocks	dollars	87172.71
c. Energy Cost Adjustment	dollars	23319.99
d. SubTotal	dollars	110732.7
e. Tax Cost - Per Unit	dollars	0
f. Tax Cost - Percent	dollars	0
g. Total	dollars	110732.7
63. Total Monthly Gas Costs		
a. January	dollars	9732.43
b. February	dollars	8839.11
c. March	dollars	8296.02
d. April	dollars	7234.89
e. May	dollars	8262.1
f. June	dollars	10420.33
g. July	dollars	11101.7
h. August	dollars	12011.76
i. September	dollars	9798.68
j. October	dollars	8164.48
k. November	dollars	7867.47
l. December	dollars	9003.73
64. Total Utility Costs		
a. Service Charges	dollars	472.44
b. Cost of All Blocks	dollars	232011.6
c. Energy Cost Adjustment	dollars	27160.84
d. SubTotal	dollars	259644.9
e. Tax Cost - Per Unit	dollars	0
f. Tax Cost - Percent	dollars	8934.73
g. Total	dollars	268579.6
65. Total Monthly Utility Costs		
a. January	dollars	19202.04
b. February	dollars	17429.61

k. November	dollars	18393.84
l. December	dollars	16207.37
66. Install/Replace Present Value		
a. Lead Chiller	dollars	188759.6
b. Lag Chiller	dollars	75201.36
c. Boiler	dollars	45544.08
d. Desiccant	dollars	0
e. Cooling Tower	dollars	135253.2
f. Cool Storage	dollars	0
g. Heat Storage	dollars	0
h. Generator	dollars	402756.1
i. Total	dollar	847514.3
67. Repair/Maint Present Value		
a. Lead Chiller	dollars	142444.5
b. Lag Chiller	dollars	76387.57
c. Boiler	dollars	1075.59
d. Desiccant	dollars	0
e. Cooling Tower	dollars	31539.52
f. Cool Storage	dollars	0
g. Heat Storage	dollars	0
h. Generator	dollars	35302.27
i. Total	dollar	286749.4
68. Life Cycle Economic Summary		
a. Electric Present Value	dollar	1918317
b. Gas Present Value	dollar	4021880
c. Operating Present Value	dollar	6226947
d. Total Present Value	dollar	7074462
69. Payback Economic Summary		
a. Annual Operating	dollars	328569.8
b. Incremental Operating	dollar	0
c. Total First Cost	dollars	595438.8
d. Incremental First Cost	dollar	0
e. Payback Period	years	1E+10
70. CHP Metrics		
a. Average Cost of Energy		
electricity	dollars/kWh	.1097961
natural gas	dollars/MMBtu	27.69232
b. Spark Spread		
difference	dollars/MMBtu	4.477648
ratio		1.161693
c. Thermal to Electric Ratios		
average heating to electric		.5898306
average cooling to electric		1.954196
total heating and cooling to electric		1.77916
d. Load Factors		
peak electric demand	kW	455.5
electric load factor		.2883122
peak heating demand	MMBtuh	1.867241
peak cooling demand	MMBtuh	4.483984
thermal load factor (heating)		.1415841
thermal load factor (chilled water)		.1953403

k. November	dollars	19214.58
l. December	dollars	18674.53
66. Install/Replace Present Value		
a. Lead Chiller	dollars	361695
b. Lag Chiller	dollars	367923.5
c. Boiler	dollars	205645.9
d. Desiccant	dollars	0
e. Cooling Tower	dollars	337500.7
f. Cool Storage	dollars	0
g. Heat Storage	dollars	0
h. Generator	dollars	1076302
i. Total	dollar	2349067
67. Repair/Maint Present Value		
a. Lead Chiller	dollars	272947.7
b. Lag Chiller	dollars	373727
c. Boiler	dollars	6991.662
d. Desiccant	dollars	0
e. Cooling Tower	dollars	78701.3
f. Cool Storage	dollars	0
g. Heat Storage	dollars	0
h. Generator	dollars	1710.991
i. Total	dollar	734078.7
68. Life Cycle Economic Summary		
a. Electric Present Value	dollar	2807183
b. Gas Present Value	dollar	2165138
c. Operating Present Value	dollar	5706400
d. Total Present Value	dollar	8055467
69. Payback Economic Summary		
a. Annual Operating	dollars	307006.4
b. Incremental Operating	dollar	-21563.41
c. Total First Cost	dollars	1676211
d. Incremental First Cost	dollar	1080772
e. Payback Period	years	50.12064
70. CHP Metrics		
a. Average Cost of Energy		
electricity	dollars/kWh	.1123163
natural gas	dollars/MMBtu	10.05144
b. Spark Spread		
difference	dollars/MMBtu	22.85694
ratio		3.273997
c. Thermal to Electric Ratios		
average heating to electric		.4605469
average cooling to electric		1.647808
total heating and cooling to electric		1.408471
d. Load Factors		
peak electric demand	kW	505
electric load factor		.3195255
peak heating demand	MMBtuh	1.829965
peak cooling demand	MMBtuh	4.371763
thermal load factor (heating)		.1386004
thermal load factor (chilled water)		.2075789