

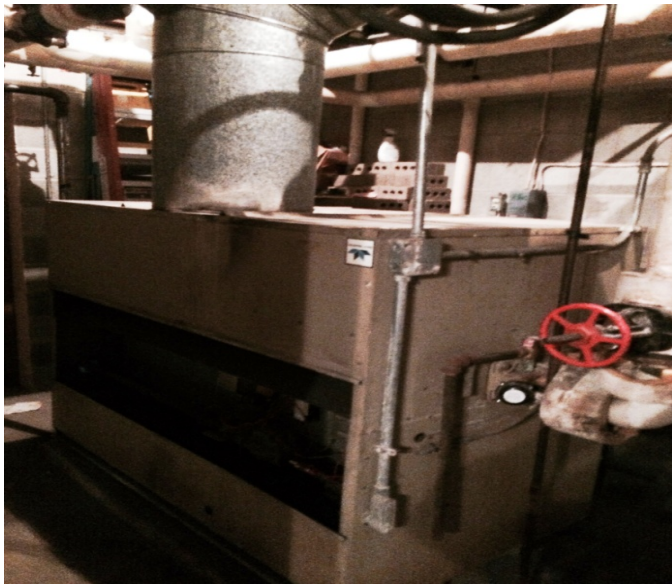
# Boiler Replacement Energy Operating Cost Study

Building:				
Address:				
City:	State:	PA	Zip:	15234



**Existing Boiler**

**New Triad Boiler**



Contractor:

Study Performed by Fire & Ice Heating & Cooling



834 Kerry Hill Drive  
Pittsburgh, PA 15234  
Tel 1-866-226-8600

## Building Information

Building	Date	10/10/19
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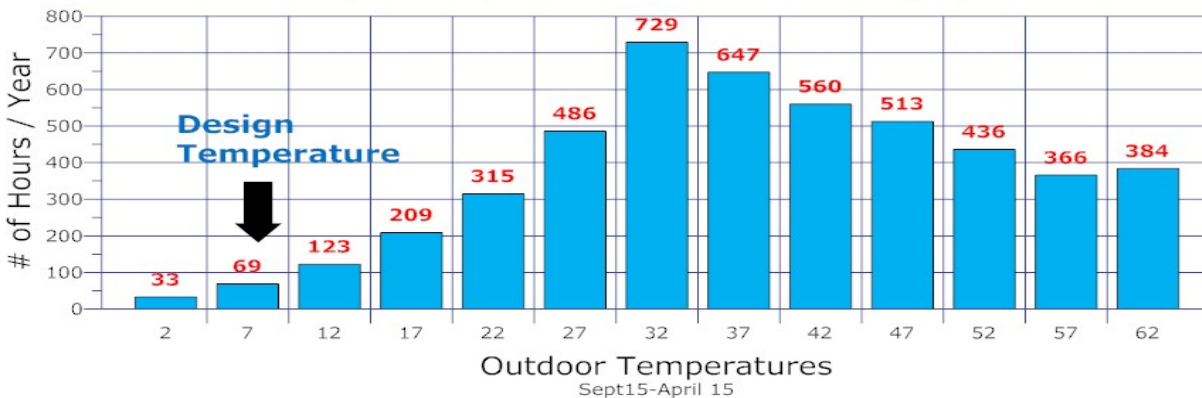
Boiler Plant Information		
	Existing	New
<b>Boiler Mfgr</b>	Teledyne Laars	Triad
<b>Model</b>	HL-1266-C-N-06-B	GPS 600 SH
<b>Input Hour High Fire</b>	1,266,000	600,000
<b>Input /Minute High Fire</b>	21,100	10,000
<b>Boiler Efficiency High Fire</b>	79.00%	85.00%
<b>Output Hr High Fire</b>	1,000,140	510,000
<b>Output/ Min High Fire</b>	16,669	8,500
<b>Input / Hr Low Fire</b>		198,000
<b>Input/ Min Low Fire</b>		3,300
<b>Output Hr Low Fire</b>		168,300
<b>Output/ Min Low Fire</b>		2,805
<b>Boiler Efficiency Low Fire</b>		85.00%
<b>Boiler HP Each</b>	30	15
<b>Total Boiler HP</b>	30	30
<b>Cu Ft Gas Hour</b>	1,206	571
<b>Cu Feet Gas Min</b>	20	10
<b>Combustion Air Hr</b>	24,114	7,429
<b>CFM Combustion Air</b>	402	124
<b>Combustion Air per cu ft gas</b>	20	13
<b>Prepurge Minutes</b>		1
<b>Boiler Quan</b>	1	2
<b>Total Btu Capacity</b>	1,266,000	1,200,000
<b>Jacket Loss Percentage</b>	3.00%	1.00%
<b>Jacket Loss Min/Boiler *</b>	633	100
<b>Boiler Type</b>	Copper	Steel

Building Information	
Building Square Footage	40,000
Btu/Square Foot	20
Heat Loss @ Design Temperature	800,000
Heat Loss Minute	13,333
Cost per MCF Natural Gas	\$5.11
System Water Capacity Gallons	598
Heating Plant Difference	66,000
Heating Plant Reduction %	5.21%
Boiler Room Temperature	60

<b>Anticipated Energy Reduction</b>	<b>14.19%</b>
<b>Anticipated Emissions Reduction</b>	<b>14%</b>

\*Jacket loss is for both existing boilers

## Hourly Temperatures Pittsburgh, PA



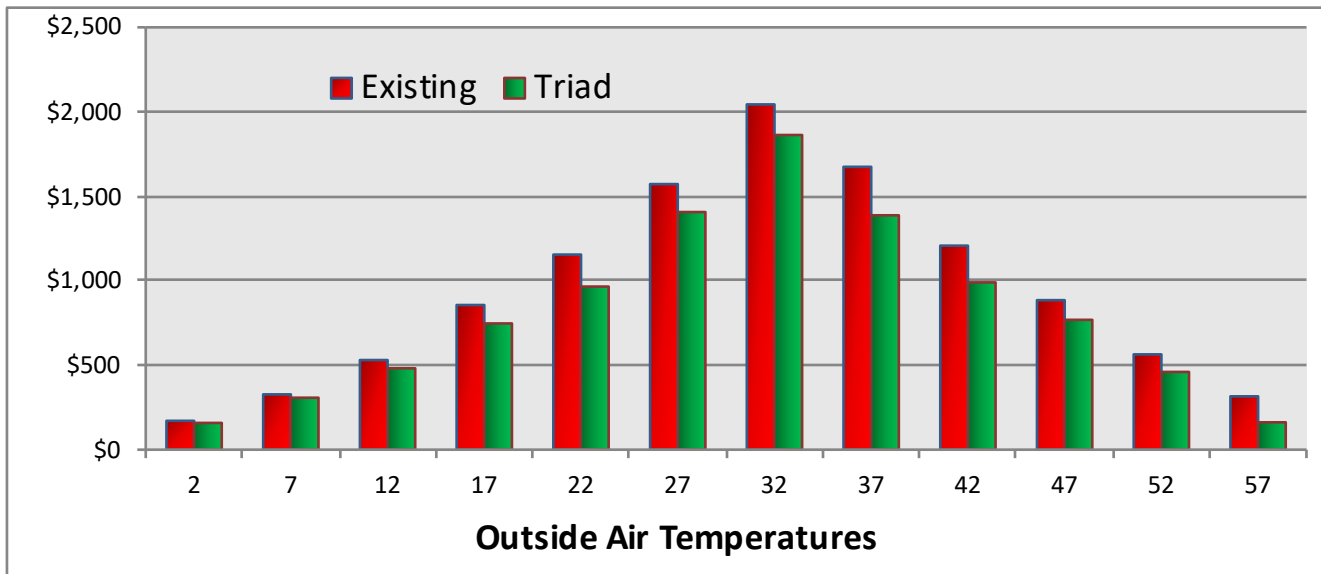
## Energy Savings Comparison

**Fuel Consumption in \$**

OA Temp	Existing Fuel Cost	Triad Fuel Cost	Savings
2	\$171	\$158	\$12
7	\$327	\$308	\$20
12	\$530	\$482	\$49
17	\$856	\$747	\$109
22	\$1,155	\$965	\$189
27	\$1,572	\$1,407	\$165
32	\$2,044	\$1,863	\$181
37	\$1,674	\$1,387	\$287
42	\$1,208	\$990	\$217
47	\$885	\$769	\$116
52	\$564	\$460	\$104
57	\$316	\$162	\$154
<b>TOTALS</b>	<b>\$11,302</b>	<b>\$9,698</b>	<b>\$1,604</b>

**Fuel Consumption in Btu's**

Saving %	OA Temp	Existing Fuel Cost	Triad Fuel Cost
7.25%	2	33,422,400	31,000,200
6.03%	7	64,059,600	60,195,600
9.19%	12	103,812,000	94,267,200
12.75%	17	167,576,200	146,216,400
16.39%	22	225,981,000	188,937,000
10.52%	27	307,638,000	275,270,400
8.86%	32	399,929,400	364,500,000
17.14%	37	327,640,800	271,481,200
18.01%	42	236,320,000	193,760,000
13.15%	47	173,188,800	150,411,600
18.40%	52	110,395,200	90,077,600
48.70%	57	61,780,800	31,695,600
<b>14.19%</b>	<b>TOTALS</b>	<b>2,211,744,200</b>	<b>1,897,812,800</b>



Environmental Impact Statement					Estimated consumption	
	Existing Boilers	New Boilers	Reduction Amount	Pollution Reduction	Existing Boilers	New Boilers
PM	15,482,209	13,284,690	2,197,520	14%	2,211,744,200	1,897,812,800
Nox	203,480,466	174,598,778	28,881,689	14%		
SO2	2,211,744	1,897,813	313,931	14%	<b>Average Emission Reduction</b> <b>14%</b>	
VOC*	5,418,773,290	4,649,641,360	769,131,930	14%		
CO2	258,774,071,400	222,044,097,600	36,729,973,800	14%		
CO	88,469,768	75,912,512	12,557,256	14%		
Pounds/ million Btu						
Fuel	PM	Nox	SO2	VOC *	CO	CO2
Natural Gas	0.007	0.092		0.001	2.45	0.04
#2 Fuel Oil	0.084	0.448		1.122	1.81	0.033

Source: Natural Gas.org

VOC is measure in Grams per million Btu's Source EPA-AP-42 Emissions Factors

PM = Particulate Matter

VOC = Volatile Organic Compound

Nox = Nitrogen Oxides

CO= Carbon Monoxide

SO2 = Sulfur Dioxide

CO2= Carbon Dioxide

## Building Water Temperature Requirements

OA Temp	HW Supply	Hrs Yr	Heat Loss	Multiplier	Building Heat Loss Minute
2	180	33	800,000	61,538	13,333
7	175	69	738,462		12,308
12	170	123	676,923		11,282
17	165	209	615,385		10,256
22	160	315	553,846		9,231
27	155	486	492,308		8,205
32	150	729	430,769		7,179
37	145	647	369,231		6,154
42	140	560	307,692		5,128
47	135	513	246,154		4,103
52	130	436	184,615		3,077
57	125	366	123,077		2,051
62	120	384	61,538		1,026

Study based upon replacing two Teledyne Laars boilers with two Triad model 700 boilers.

### Assumptions

Jacket loss is continuous for existing boiler as it is not isolated. Triad jacket loss is only when the boiler is firing.

Cu Ft Gas Hr = 1050 Btu's per cubic feet

Cu Feet Air for burner based upon 13 cu feet air per cu foot of gas or 30% excess air Stoichiometric is 10 parts air per 1 part gas

System water capacity is 20 times Existing boiler HP

Simulation based upon 30 minutes Estimated savings based upon doubling results to obtain hourly costs and savings

Boilers start when loop temperature drops 5 degrees F

Bin temperatures based upon Pittsburgh, PA and NOAA Weather Data

Natural gas cost for study is \$3.74 per MCF Actual gas cost



834 Kerry Hill Drive  
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Pittsburgh, PA 15234

<b>Outside Air Temperature</b>			<b>Degrees F</b>	<b>2</b>
<b>Building</b>			<b>Hrs Year</b>	<b>33</b>
<b>Estimated costs @ this temperature</b>				
<b>Existing Boiler</b>	<b>New Boiler</b>	<b>Savings</b>	<b>Combustion Air Temperature</b>	
\$170.79	\$158.41	\$12.38	60	
<b>System Capacity Gallons</b>				<b>Bldg Heat Loss /Minute</b>
598				13,333

<b>Existing Boiler</b>												
<b>Existing Boiler Mfgr</b>		<b>Model</b>		<b>Quantity</b>	<b>Input Hr High</b>	<b>Output Hr Low</b>	<b>Efficiency</b>	<b>Boiler Type</b>				
Teledyne Laars		HL-1266-C-N-06-B		1	1,266,000	1,000,140	79.00%	Copper				
<b>Prepurge Loss / Minute</b>			<b>Jacket Loss Minute</b>			<b>Water Temperature</b>		<b>Total Boiler HP</b>				
420			633			180		30				
<b>High Fire</b>					<b>Low Fire</b>							
<b>Input Minute</b>		<b>Output Minute</b>		<b>Efficiency</b>	<b>Input Minute</b>			<b>Output Minute</b>		<b>Efficiency</b>		
21,100		16,669		79%						#DIV/0!		
<b>Minute</b>	<b>Btu in Loop</b>		<b>Building Heat Loss</b>	<b>Prepurge</b>	<b>Jacket Loss</b>	<b>Jacket Loss</b>	<b>Total Loss</b>	<b>Output Low Fire</b>	<b>Output High Fire</b>	<b>Output</b>	<b>Input</b>	<b>Loop Temp</b>
1	896,038	13,333			1	633	13,966					177.8
2	882,072	13,333			1	633	13,966					175.0
3	868,106	13,333			1	633	13,966	1		16,669	21,100	175.6
4	870,808	13,333			1	633	13,966	1		16,669	21,100	176.1
5	873,511	13,333			1	633	13,966	1		16,669	21,100	176.7
6	876,214	13,333			1	633	13,966	1		16,669	21,100	177.2
7	878,916	13,333			1	633	13,966	1		16,669	21,100	177.7
8	881,619	13,333			1	633	13,966	1		16,669	21,100	178.3
9	884,322	13,333			1	633	13,966	1		16,669	21,100	178.8
10	887,024	13,333			1	633	13,966	1		16,669	21,100	179.4
11	889,727	13,333			1	633	13,966	1		16,669	21,100	179.9
12	892,430	13,333			1	633	13,966	1		16,669	21,100	180.5
13	895,132	13,333			1	633	13,966	1				177.7
14	881,166	13,333			1	633	13,966					174.8
15	867,200	13,333			1	633	13,966	1		16,669	21,100	175.4
16	869,902	13,333			1	633	13,966	1		16,669	21,100	175.9
17	872,605	13,333			1	633	13,966	1		16,669	21,100	176.5
18	875,308	13,333			1	633	13,966	1		16,669	21,100	177.0
19	878,010	13,333			1	633	13,966	1		16,669	21,100	177.6
20	880,713	13,333			1	633	13,966	1		16,669	21,100	178.1
21	883,416	13,333			1	633	13,966	1		16,669	21,100	178.7
22	886,118	13,333			1	633	13,966	1		16,669	21,100	179.2
23	888,821	13,333			1	633	13,966	1		16,669	21,100	179.7
24	891,524	13,333			1	633	13,966	1		16,669	21,100	180.3
25	894,226	13,333			1	633	13,966					177.5
26	880,260	13,333			1	633	13,966					174.7
27	866,294	13,333			1	633	13,966	1		16,669	21,100	175.2
28	868,996	13,333			1	633	13,966	1		16,669	21,100	175.7
29	871,699	13,333			1	633	13,966	1		16,669	21,100	176.3
30	874,402	13,333			1	633	13,966	1		16,669	21,100	176.2
<b>TOTALS</b>		400,000			18,990		418,990			400,056	506,400	
<b>Efficiency</b>		78.99%			<b>MCF Used</b>		1.0					

New Boiler												
Existing Boiler Mfgr		Model		Quantity		Input Hr High		Output Hr Low		Efficiency	Boiler Type	
Triad		GPS 600 SH		2		600,000		510,000		85.00%	Steel	
Prepurg Loss / Minute			Jacket Loss Minute			Water Temperature			Total Boiler HP			
129			100			180			30			
High Fire						Low Fire						
Input Minute		Output Minute		Efficiency		Input Minute		Output Minute		Efficiency		
10,000		8,500		85%		3,300		2,805		85.00%		
Minute	Btu in Loop	Building Heat Loss	Prepurg	Jacket Loss	Jacket Loss	Total Loss	Output Low Fire	Output High Fire	Output	Input	Loop Temp	
1	896,038	13,333				13,333					178.0	
2	882,705	13,333				13,333					175.3	
3	869,372	13,333	1	129		13,463					172.6	
4	855,909	13,333	1	129	1	13,563	1		8,500	10,000	171.5	
5	850,847	13,333			2	13,533	2		17,000	20,000	172.2	
6	854,313	13,333			2	13,533	2		17,000	20,000	172.9	
7	857,780	13,333			2	13,533	2		17,000	20,000	173.6	
8	861,247	13,333			2	13,533	2		17,000	20,000	174.3	
9	864,713	13,333			2	13,533	2		17,000	20,000	175.0	
10	868,180	13,333			2	13,533	2		17,000	20,000	175.7	
11	871,647	13,333			2	13,533	2		17,000	20,000	176.4	
12	875,113	13,333			2	13,533	2		17,000	20,000	177.1	
13	878,580	13,333			2	13,533	2		17,000	20,000	177.8	
14	882,047	13,333			2	13,533	2		17,000	20,000	178.5	
15	885,513	13,333			2	13,533	2		17,000	20,000	179.2	
16	888,980	13,333			2	13,533	2		17,000	20,000	179.9	
17	892,447	13,333			2	13,533	2		17,000	20,000	180.6	
18	895,913	13,333			2	13,533	1	1	11,305	13,300	180.2	
19	893,685	13,333			2	13,533	1	1	11,305	13,300	179.7	
20	891,457	13,333			2	13,533	1	1	11,305	13,300	179.3	
21	889,228	13,333			2	13,533	1	1	11,305	13,300	178.8	
22	887,000	13,333			2	13,533		2	17,000	20,000	179.5	
23	890,467	13,333			2	13,533		2	17,000	20,000	180.2	
24	893,933	13,333			2	13,533	1	1	11,305	13,300	179.8	
25	891,705	13,333			2	13,533	1	1	11,305	13,300	179.3	
26	889,477	13,333			2	13,533	1	1	11,305	13,300	178.9	
27	887,248	13,333			2	13,533		2	17,000	20,000	179.6	
28	890,715	13,333			2	13,533		2	17,000	20,000	180.3	
29	894,182	13,333			2	13,533	1	1	11,305	13,300	179.8	
30	891,953	13,333			2	13,533	1	1	11,305	13,300	178.7	
TOTALS		400,000				5,300		405,559		399,245		469,700
Efficiency		85.16%				MCF Used		0.9				

Outside Air Temperature						Degrees F		7			
Building		Estimated costs @ this temperature						Hrs Year	69		
Existing Boiler		New Boiler		Savings		Combustion Air Temperature					
\$327.34		\$307.60		\$19.75		60					
System Capacity Gallons		Bldg Heat Loss /Minute									
598		12,308									
Existing Boiler											
Existing Boiler Mfr		Model		Quantity	Input Hr High	Output Hr Low		Efficiency	Boiler Type		
Teledyne Laars		HL-1266-C-N-06-B		1	1,266,000	1,000,140		79.00%	Copper		
Prepurge Loss / Minute		Jacket Loss Minute		Water Temperature			Total Boiler HP				
383		633		175			30				
High Fire					Low Fire						
Input Minute		Output Minute		Efficiency	Input Minute			Output Minute		Efficiency	
21,100		16,669		79%						#DIV/0!	
Minute	Btu in Loop	Building Heat Loss	Prepurge	Jacket Loss	Jacket Loss	Total Loss	Output Low Fire	Output High Fire	Output	Input	Loop Temp
1	871,148	12,308		1	633	12,941					173.0
2	858,208	12,308		1	633	12,941					170.4
3	845,267	12,308		1	633	12,941	1		16,669	21,100	171.2
4	848,995	12,308		1	633	12,941	1		16,669	21,100	171.9
5	852,724	12,308		1	633	12,941	1		16,669	21,100	172.7
6	856,452	12,308		1	633	12,941	1		16,669	21,100	173.4
7	860,180	12,308		1	633	12,941	1		16,669	21,100	174.2
8	863,909	12,308		1	633	12,941	1		16,669	21,100	174.9
9	867,637	12,308		1	633	12,941	1		16,669	21,100	175.7
10	871,365	12,308		1	633	12,941					173.1
11	858,425	12,308		1	633	12,941					170.5
12	845,484	12,308		1	633	12,941	1		16,669	21,100	171.2
13	849,212	12,308		1	633	12,941	1		16,669	21,100	172.0
14	852,940	12,308		1	633	12,941	1		16,669	21,100	172.7
15	856,669	12,308		1	633	12,941	1		16,669	21,100	173.5
16	860,397	12,308		1	633	12,941	1		16,669	21,100	174.2
17	864,125	12,308		1	633	12,941	1		16,669	21,100	175.0
18	867,854	12,308		1	633	12,941					172.4
19	854,913	12,308		1	633	12,941					169.8
20	841,972	12,308		1	633	12,941	1		16,669	21,100	170.5
21	845,701	12,308		1	633	12,941	1		16,669	21,100	171.3
22	849,429	12,308		1	633	12,941	1		16,669	21,100	172.0
23	853,157	12,308		1	633	12,941	1		16,669	21,100	172.8
24	856,886	12,308		1	633	12,941	1		16,669	21,100	173.5
25	860,614	12,308		1	633	12,941	1		16,669	21,100	174.3
26	864,342	12,308		1	633	12,941	1		16,669	21,100	175.0
27	868,070	12,308		1	633	12,941					172.4
28	855,130	12,308		1	633	12,941					169.8
29	842,189	12,308		1	633	12,941	1		16,669	21,100	170.5
30	845,917	12,308		1	633	12,941	1		16,669	21,100	170.7
TOTALS		369,231			18,990	388,221			366,718	464,200	
Efficiency				79.54%	MCF Used						0.9

New Boiler											
Existing Boiler Mfr		Model		Quantity		Input Hr High		Output Hr Low		Efficiency	Boiler Type
Triad		GPS 600 SH		2		600,000		510,000		85.00%	Steel
Prepurge Loss / Minute			Jacket Loss Minute			Water Temperature			Total Boiler HP		
138			100			175			30		
High Fire						Low Fire					
Input Minute		Output Minute		Efficiency		Input Minute		Output Minute		Efficiency	
10,000		8,500		85%		3,300		2,805		85.00%	
Minute	Btu in Loop	Building Heat Loss	Prepurge	Jacket Loss	Jacket Loss	Total Loss	Output Low Fire	Output High Fire	Output	Input	Loop Temp
1	871,148	12,308				12,308					173.2
2	858,841	12,308				12,308					170.7
3	846,533	12,308	1	138		12,446					168.2
4	834,087	12,308	1	138	1	100	12,546	1	8,500	10,000	167.3
5	830,041	12,308			2	200	12,508	2	17,000	20,000	168.3
6	834,534	12,308			2	200	12,508	2	17,000	20,000	169.2
7	839,026	12,308			2	200	12,508	2	17,000	20,000	170.1
8	843,518	12,308			2	200	12,508	2	17,000	20,000	171.0
9	848,011	12,308			2	200	12,508	2	17,000	20,000	171.9
10	852,503	12,308			2	200	12,508	2	17,000	20,000	172.8
11	856,995	12,308			2	200	12,508	2	17,000	20,000	173.7
12	861,488	12,308			2	200	12,508	2	17,000	20,000	174.6
13	865,980	12,308			2	200	12,508	2	17,000	20,000	175.5
14	870,472	12,308			2	200	12,508	1	11,305	13,300	175.3
15	869,269	12,308			2	200	12,508	1	11,305	13,300	175.0
16	868,067	12,308			2	200	12,508	1	11,305	13,300	174.8
17	866,864	12,308			2	200	12,508	1	11,305	13,300	174.5
18	865,661	12,308			2	200	12,508	1	11,305	13,300	174.3
19	864,459	12,308			2	200	12,508	1	11,305	13,300	174.0
20	863,256	12,308			2	200	12,508	1	11,305	13,300	173.8
21	862,053	12,308			2	200	12,508	2	17,000	20,000	174.7
22	866,546	12,308			2	200	12,508		17,000	20,000	175.6
23	871,038	12,308			2	200	12,508	1	11,305	13,300	175.4
24	869,835	12,308			2	200	12,508	1	11,305	13,300	175.1
25	868,633	12,308			2	200	12,508	1	11,305	13,300	174.9
26	867,430	12,308			2	200	12,508	1	11,305	13,300	174.6
27	866,227	12,308			2	200	12,508	1	11,305	13,300	174.4
28	865,024	12,308			2	200	12,508	1	11,305	13,300	174.2
29	863,822	12,308			2	200	12,508	1	11,305	13,300	173.9
30	862,619	12,308			2	200	12,508	2	17,000	20,000	174.2
TOTALS		369,231				5,300	374,807		370,770	436,200	
Efficiency			84.65%			MCF Used			0.9		



Outside Air Temperature						Degrees F		12				
Building						Hrs Year		123				
Estimated costs @ this temperature												
Existing Boiler		New Boiler		Savings		Combustion Air Temperature						
\$530.48		\$481.71		\$48.77		60						
System Capacity Gallons						Bldg Heat Loss /Minute						
598						11,282						
Existing Boiler												
Existing Boiler Mfgr		Model		Quantity	Input Hr High	Output Hr Low		Efficiency	Boiler Type			
Teledyne Laars		HL-1266-C-N-06-B		1	1,266,000	1,000,140		79.00%	Copper			
Prepurge Loss / Minute		Jacket Loss Minute		Water Temperature			Total Boiler HP					
347		633		170			30					
High Fire					Low Fire							
Input Minute		Output Minute	Efficiency		Input Minute		Output Minute		Efficiency			
21,100		16,669	79%						#DIV/0!			
Minute	Btu in Loop	Building Heat Loss	Prepurge	Jacket Loss	Jacket Loss	Total Loss	Output Low Fire	Output High Fire	Output	Input	Loop Temp	
1	846,259	11,282		1	633	11,915					168.2	
2	834,343	11,282		1	633	11,915					165.8	
3	822,428	11,282		1	633	11,915		1	16,669	21,100	166.8	
4	827,182	11,282		1	633	11,915		1	16,669	21,100	167.7	
5	831,936	11,282		1	633	11,915		1	16,669	21,100	168.7	
6	836,690	11,282		1	633	11,915		1	16,669	21,100	169.6	
7	841,444	11,282		1	633	11,915		1	16,669	21,100	170.6	
8	846,198	11,282		1	633	11,915					168.2	
9	834,283	11,282		1	633	11,915					165.8	
10	822,368	11,282		1	633	11,915		1	16,669	21,100	166.8	
11	827,122	11,282		1	633	11,915		1	16,669	21,100	167.7	
12	831,876	11,282		1	633	11,915		1	16,669	21,100	168.7	
13	836,630	11,282		1	633	11,915		1	16,669	21,100	169.6	
14	841,384	11,282		1	633	11,915		1	16,669	21,100	170.6	
15	846,138	11,282		1	633	11,915					168.2	
16	834,223	11,282		1	633	11,915					165.8	
17	822,308	11,282		1	633	11,915		1	16,669	21,100	166.7	
18	827,062	11,282		1	633	11,915		1	16,669	21,100	167.7	
19	831,816	11,282		1	633	11,915		1	16,669	21,100	168.7	
20	836,570	11,282		1	633	11,915		1	16,669	21,100	169.6	
21	841,323	11,282		1	633	11,915		1	16,669	21,100	170.6	
22	846,077	11,282		1	633	11,915					168.2	
23	834,162	11,282		1	633	11,915					165.8	
24	822,247	11,282		1	633	11,915		1	16,669	21,100	166.7	
25	827,001	11,282		1	633	11,915		1	16,669	21,100	167.7	
26	831,755	11,282		1	633	11,915		1	16,669	21,100	168.6	
27	836,509	11,282		1	633	11,915		1	16,669	21,100	169.6	
28	841,263	11,282		1	633	11,915		1	16,669	21,100	170.6	
29	846,017	11,282		1	633	11,915					168.2	
30	834,102	11,282		1	633	11,915					165.2	
TOTALS		338,462				18,990		357,452		333,380		422,000
Efficiency		80.20%		MCF Used		0.8						

New Boiler												
Existing Boiler Mfgr		Model		Quantity	Input Hr High		Output Hr Low		Efficiency	Boiler Type		
Triad		GPS 600 SH		2	600,000		510,000		85.00%	Steel		
Prepurge Loss / Minute			Jacket Loss Minute			Water Temperature			Total Boiler HP			
107			100			170			30			
High Fire						Low Fire						
Input Minute		Output Minute		Efficiency		Input Minute			Output Minute		Efficiency	
10,000		8,500		85%		3,300			2,805		85.00%	
Minute	Btu in Loop	Building Heat Loss	Prepurge	Prepurge	Jacket Loss	Jacket Loss	Total Loss	Output Low Fire	Output High Fire	Output	Input	Loop Temp
1	846,259	11,282					11,282					168.3
2	834,976	11,282					11,282					166.1
3	823,694	11,282					11,282					163.8
4	812,412	11,282	1	107			11,389					161.5
5	801,023	11,282	1	107	1	100	11,489	1		8,500	10,000	160.9
6	798,034	11,282			2	200	11,482	2		17,000	20,000	162.0
7	803,552	11,282			2	200	11,482	2		17,000	20,000	163.1
8	809,070	11,282			2	200	11,482	2		17,000	20,000	164.2
9	814,588	11,282			2	200	11,482	2		17,000	20,000	165.3
10	820,106	11,282			2	200	11,482	2		17,000	20,000	166.5
11	825,624	11,282			2	200	11,482	2		17,000	20,000	167.6
12	831,142	11,282			2	200	11,482	2		17,000	20,000	168.7
13	836,660	11,282			2	200	11,482	2		17,000	20,000	169.8
14	842,178	11,282			2	200	11,482	2		17,000	20,000	170.9
15	847,696	11,282			1	100	11,382	1		2,805	3,300	169.2
16	839,119	11,282			1	100	11,382	1		2,805	3,300	167.4
17	830,542	11,282			1	100	11,382	1		8,500	10,000	166.9
18	827,660	11,282			1	100	11,382	1		8,500	10,000	166.3
19	824,778	11,282			1	100	11,382	1		8,500	10,000	165.7
20	821,896	11,282	1	107	1	100	11,489	1		8,500	10,000	165.1
21	818,907	11,282			2	200	11,482	2		17,000	20,000	166.2
22	824,425	11,282			2	200	11,482	2		17,000	20,000	167.3
23	829,942	11,282			2	200	11,482	2		17,000	20,000	168.4
24	835,460	11,282			2	200	11,482	2		17,000	20,000	169.5
25	840,978	11,282			2	200	11,482	2		17,000	20,000	170.7
26	846,496	11,282			2	200	11,482	1	1	11,305	13,300	170.6
27	846,319	11,282			1	100	11,382	1		2,805	3,300	168.9
28	837,742	11,282			1	100	11,382	1		8,500	10,000	168.3
29	834,860	11,282			1	100	11,382	1		8,500	10,000	167.7
30	831,978	11,282			1	100	11,382	1		8,500	10,000	166.6
TOTALS		338,462				4,100	342,882			325,720	383,200	
Efficiency				88.33%		MCF Used						0.8

Outside Air Temperature						Degrees F		17			
Building								Hrs Year	209		
Estimated costs @ this temperature											
Existing Boiler		New Boiler		Savings		Combustion Air Temperature					
\$856.31		\$747.17		\$109.15		60					
System Capacity Gallons								Bldg Heat Loss /Minute			
598								10,256			
Existing Boiler											
Existing Boiler Mfr		Model		Quantity	Input Hr High	Output Hr Low	Efficiency	Boiler Type			
Teledyne Laars		HL-1266-C-N-06-B		1	1,266,000	1,000,140	79.00%	Copper			
Prepurge Loss / Minute		Jacket Loss Minute		Water Temperature			Total Boiler HP				
311		633		165			30				
High Fire					Low Fire						
Input Minute		Output Minute		Efficiency	Input Minute		Output Minute		Efficiency		
21,100		16,669		79%					#DIV/0!		
Minute	Btu in Loop	Building Heat Loss	Prepurge	Jacket Loss	Jacket Loss	Total Loss	Output Low Fire	Output High Fire	Output	Input	Loop Temp
1	821,369	10,256		1	633	10,889					163.4
2	810,479	10,256		1	633	10,889					161.2
3	799,590	10,256		1	633	10,889					159.0
4	788,700	10,256		1	633	10,889	1		16,669	21,100	160.2
5	794,480	10,256		1	633	10,889	1		16,669	21,100	161.3
6	800,260	10,256		1	633	10,889	1		16,669	21,100	162.5
7	806,039	10,256		1	633	10,889	1		16,669	21,100	163.7
8	811,819	10,256		1	633	10,889	1		16,669	21,100	164.8
9	817,598	10,256		1	633	10,889	1		16,669	21,100	166.0
10	823,378	10,256		1	633	10,889					163.8
11	812,488	10,256		1	633	10,889					161.6
12	801,599	10,256		1	633	10,889					159.4
13	790,710	10,256		1	633	10,889	1		16,669	21,100	160.6
14	796,489	10,256		1	633	10,889	1		16,669	21,100	161.7
15	802,269	10,256		1	633	10,889	1		16,669	21,100	162.9
16	808,048	10,256		1	633	10,889	1		16,669	21,100	164.1
17	813,828	10,256		1	633	10,889	1		16,669	21,100	165.2
18	819,608	10,256		1	633	10,889					163.0
19	808,718	10,256		1	633	10,889					160.9
20	797,829	10,256		1	633	10,889	1		16,669	21,100	162.0
21	803,608	10,256		1	633	10,889	1		16,669	21,100	163.2
22	809,388	10,256		1	633	10,889	1		16,669	21,100	164.3
23	815,168	10,256		1	633	10,889	1		16,669	21,100	165.5
24	820,947	10,256		1	633	10,889					163.3
25	810,058	10,256		1	633	10,889					161.1
26	799,168	10,256		1	633	10,889					158.9
27	788,279	10,256		1	633	10,889	1		16,669	21,100	160.1
28	794,058	10,256		1	633	10,889	1		16,669	21,100	161.3
29	799,838	10,256		1	633	10,889	1		16,669	21,100	162.4
30	805,618	10,256		1	633	10,889	1		16,669	21,100	163.0
TOTALS		307,692			18,990	326,682			316,711	400,900	
Efficiency				76.75%	MCF Used						0.8

New Boiler												
Existing Boiler Mfr		Model		Quantity		Input Hr High		Output Hr Low		Efficiency	Boiler Type	
Triad		GPS 600 SH		2		600,000		510,000		85.00%	Steel	
Prepurge Loss / Minute			Jacket Loss Minute			Water Temperature			Total Boiler HP			
96			100			165			30			
High Fire						Low Fire						
Input Minute		Output Minute		Efficiency		Input Minute		Output Minute		Efficiency		
10,000		8,500		85%		3,300		2,805		85.00%		
Minute	Btu in Loop	Building Heat Loss	Prepurge	Prepurge	Jacket Loss	Jacket Loss	Total Loss	Output Low Fire	Output High Fire	Output	Input	Loop Temp
1	821,369	10,256					10,256					163.5
2	811,112	10,256					10,256					161.5
3	800,856	10,256					10,256					159.4
4	790,599	10,256	1	96			10,352					157.3
5	780,247	10,256	1	96	1	100	10,452	1		8,500	10,000	156.9
6	778,295	10,256			2	200	10,456	2		17,000	20,000	158.2
7	784,838	10,256			2	200	10,456	2		17,000	20,000	159.6
8	791,382	10,256			2	200	10,456	2		17,000	20,000	160.9
9	797,926	10,256			2	200	10,456	2		17,000	20,000	162.2
10	804,469	10,256			2	200	10,456	2		17,000	20,000	163.5
11	811,013	10,256			2	200	10,456	2		17,000	20,000	164.8
12	817,556	10,256			2	200	10,456	2		17,000	20,000	166.1
13	824,100	10,256			2	200	10,456	1	1	11,305	13,300	166.3
14	824,949	10,256			1	100	10,356	1		2,805	3,300	164.8
15	817,397	10,256			1	100	10,356	1		2,805	3,300	163.3
16	809,846	10,256			1	100	10,356	1		8,500	10,000	162.9
17	807,989	10,256			1	100	10,356	1		8,500	10,000	162.5
18	806,133	10,256			1	100	10,356	1		8,500	10,000	162.2
19	804,277	10,256			1	100	10,356	1		8,500	10,000	161.8
20	802,420	10,256			1	100	10,356	1		8,500	10,000	161.4
21	800,564	10,256			1	100	10,356	1		8,500	10,000	161.0
22	798,707	10,256			1	100	10,356	1		8,500	10,000	160.7
23	796,851	10,256	1	96	1	100	10,452	1		8,500	10,000	160.3
24	794,899	10,256			2	200	10,456	2		17,000	20,000	161.6
25	801,442	10,256			2	200	10,456	2		17,000	20,000	162.9
26	807,986	10,256			2	200	10,456	2		17,000	20,000	164.2
27	814,529	10,256			2	200	10,456	2		17,000	20,000	165.5
28	821,073	10,256			2	200	10,456	1	1	11,305	13,300	165.7
29	821,922	10,256			1	100	10,356	1		2,805	3,300	164.2
30	814,370	10,256			1	100	10,356	1		2,805	3,300	162.1
TOTALS		307,692				3,900		311,880		297,330		349,800
Efficiency			87.96%			MCF Used			0.7			

Outside Air Temperature						Degrees F		22			
Building						Hrs Year		315			
Estimated costs @ this temperature											
Existing Boiler		New Boiler		Savings		Combustion Air Temperature					
\$1,154.76		\$965.47		\$189.29		60					
System Capacity Gallons						Bldg Heat Loss /Minute					
598						9,231					
Existing Boiler											
Existing Boiler Mfr		Model		Quantity	Input Hr High	Output Hr Low	Efficiency	Boiler Type			
Teledyne Laars		HL-1266-C-N-06-B		1	1,266,000	1,000,140	79.00%	Copper			
Prepurge Loss / Minute		Jacket Loss Minute		Water Temperature			Total Boiler HP				
275		633		160			30				
High Fire					Low Fire						
Input Minute		Output Minute		Efficiency	Input Minute		Output Minute		Efficiency		
21,100		16,669		79%					#DIV/0!		
Minute	Btu in Loop	Building Heat Loss	Prepurge	Jacket Loss	Jacket Loss	Total Loss	Output Low Fire	Output High Fire	Output	Input	Loop Temp
1	796,479	9,231		1	633	9,864					158.6
2	786,615	9,231		1	633	9,864					156.6
3	776,751	9,231		1	633	9,864					154.6
4	766,887	9,231		1	633	9,864	1		16,669	21,100	156.0
5	773,693	9,231		1	633	9,864	1		16,669	21,100	157.4
6	780,498	9,231		1	633	9,864	1		16,669	21,100	158.7
7	787,303	9,231		1	633	9,864	1		16,669	21,100	160.1
8	794,108	9,231		1	633	9,864					158.1
9	784,244	9,231		1	633	9,864					156.1
10	774,381	9,231		1	633	9,864					154.1
11	764,517	9,231		1	633	9,864	1		16,669	21,100	155.5
12	771,322	9,231		1	633	9,864	1		16,669	21,100	156.9
13	778,127	9,231		1	633	9,864	1		16,669	21,100	158.3
14	784,933	9,231		1	633	9,864	1		16,669	21,100	159.6
15	791,738	9,231		1	633	9,864	1		16,669	21,100	161.0
16	798,543	9,231		1	633	9,864					159.0
17	788,679	9,231		1	633	9,864					157.0
18	778,816	9,231		1	633	9,864					155.0
19	768,952	9,231		1	633	9,864	1		16,669	21,100	156.4
20	775,757	9,231		1	633	9,864	1		16,669	21,100	157.8
21	782,562	9,231		1	633	9,864	1		16,669	21,100	159.1
22	789,367	9,231		1	633	9,864	1		16,669	21,100	160.5
23	796,173	9,231		1	633	9,864					158.5
24	786,309	9,231		1	633	9,864					156.5
25	776,445	9,231		1	633	9,864					154.6
26	766,581	9,231		1	633	9,864	1		16,669	21,100	155.9
27	773,387	9,231		1	633	9,864	1		16,669	21,100	157.3
28	780,192	9,231		1	633	9,864	1		16,669	21,100	158.7
29	786,997	9,231		1	633	9,864	1		16,669	21,100	160.0
30	793,802	9,231		1	633	9,864					157.5
TOTALS		276,923			18,990	295,913			283,373	358,700	
Efficiency				77.20%	MCF Used		0.7				

New Boiler						
Existing Boiler Mfgr	Model	Quantity	Input Hr High	Output Hr Low	Efficiency	Boiler Type
Triad	GPS 600 SH	2	600,000	510,000	85.00%	Steel
Prepurge Loss / Minute	Jacket Loss Minute		Water Temperature		Total Boiler HP	
85	100		160		30	
High Fire			Low Fire			
Input Minute	Output Minute	Efficiency	Input Minute	Output Minute	Efficiency	
10,000	8,500	85%	3,300	2,805	85.00%	

Minute	Btu in Loop	Building Heat Loss	Prepurge	Jacket Loss	Jacket Loss	Total Loss	Output Low Fire	Output High Fire	Output	Input	Loop Temp
1	796,479	9,231				9,231					158.7
2	787,248	9,231				9,231					156.9
3	778,017	9,231				9,231					155.0
4	768,786	9,231	1	85		9,315					153.1
5	759,471	9,231	1	85	1	9,415	1		8,500	10,000	152.9
6	758,555	9,231			2	9,431	2		17,000	20,000	154.5
7	766,125	9,231			2	9,431	2		17,000	20,000	156.0
8	773,694	9,231			2	9,431	2		17,000	20,000	157.5
9	781,263	9,231			2	9,431	2		17,000	20,000	159.0
10	788,832	9,231			2	9,431	2		17,000	20,000	160.6
11	796,402	9,231			2	9,431	1	1	11,305	13,300	160.9
12	798,276	9,231			1	9,331	1		2,805	3,300	159.6
13	791,750	9,231			1	9,331	1		2,805	3,300	158.3
14	785,224	9,231			1	9,331	1		8,500	10,000	158.1
15	784,393	9,231			1	9,331	1		8,500	10,000	158.0
16	783,563	9,231			1	9,331	1		8,500	10,000	157.8
17	782,732	9,231			1	9,331	1		8,500	10,000	157.6
18	781,901	9,231			1	9,331	1		8,500	10,000	157.5
19	781,070	9,231			1	9,331	1		8,500	10,000	157.3
20	780,240	9,231			1	9,331	1		8,500	10,000	157.1
21	779,409	9,231			1	9,331	1		8,500	10,000	157.0
22	778,578	9,231			1	9,331	1		8,500	10,000	156.8
23	777,747	9,231			1	9,331	1		8,500	10,000	156.6
24	776,917	9,231			1	9,331	1		8,500	10,000	156.5
25	776,086	9,231			1	9,331	1		8,500	10,000	156.3
26	775,255	9,231			1	9,331	1		8,500	10,000	156.1
27	774,424	9,231			1	9,331	1		8,500	10,000	156.0
28	773,593	9,231			1	9,331	1		8,500	10,000	155.8
29	772,763	9,231			1	9,331	1		8,500	10,000	155.6
30	771,932	9,231	1	85	1	9,415	1		8,500	10,000	154.9
TOTALS	276,923				3,200	280,377			254,915	299,900	
Efficiency				92.34%		MCF Used		0.6			

Outside Air Temperature						Degrees F		27			
Building						Hrs Year		486			
Estimated costs @ this temperature											
Existing Boiler		New Boiler		Savings		Combustion Air Temperature					
\$1,572.03		\$1,406.63		\$165.40		60					
System Capacity Gallons						Bldg Heat Loss /Minute					
598						8,205					
Existing Boiler											
Existing Boiler Mfgr		Model		Quantity	Input Hr High	Output Hr Low	Efficiency	Boiler Type			
Teledyne Laars		HL-1266-C-N-06-B		1	1,266,000	1,000,140	79.00%	Copper			
Prepurge Loss / Minute		Jacket Loss Minute		Water Temperature			Total Boiler HP				
239		633		160			30				
High Fire					Low Fire						
Input Minute		Output Minute		Efficiency	Input Minute		Output Minute		Efficiency		
21,100		16,669		79%					#DIV/0!		
Minute	Btu in Loop	Building Heat Loss	Prepurge	Jacket Loss	Jacket Loss	Total Loss	Output Low Fire	Output High Fire	Output	Input	Loop Temp
1	796,479	8,205		1	633	8,838					158.8
2	787,640	8,205		1	633	8,838					157.0
3	778,802	8,205		1	633	8,838					155.2
4	769,964	8,205		1	633	8,838		1	16,669	21,100	156.8
5	777,795	8,205		1	633	8,838		1	16,669	21,100	158.4
6	785,626	8,205		1	633	8,838		1	16,669	21,100	160.0
7	793,457	8,205		1	633	8,838					158.2
8	784,619	8,205		1	633	8,838					156.4
9	775,781	8,205		1	633	8,838					154.6
10	766,942	8,205		1	633	8,838		1	16,669	21,100	156.2
11	774,773	8,205		1	633	8,838		1	16,669	21,100	157.8
12	782,604	8,205		1	633	8,838		1	16,669	21,100	159.4
13	790,435	8,205		1	633	8,838		1	16,669	21,100	160.9
14	798,266	8,205		1	633	8,838					159.2
15	789,428	8,205		1	633	8,838					157.4
16	780,590	8,205		1	633	8,838					155.6
17	771,752	8,205		1	633	8,838		1	16,669	21,100	157.2
18	779,582	8,205		1	633	8,838		1	16,669	21,100	158.8
19	787,413	8,205		1	633	8,838		1	16,669	21,100	160.3
20	795,244	8,205		1	633	8,838					158.5
21	786,406	8,205		1	633	8,838					156.8
22	777,568	8,205		1	633	8,838					155.0
23	768,730	8,205		1	633	8,838		1	16,669	21,100	156.6
24	776,561	8,205		1	633	8,838		1	16,669	21,100	158.1
25	784,392	8,205		1	633	8,838		1	16,669	21,100	159.7
26	792,222	8,205		1	633	8,838		1	16,669	21,100	161.3
27	800,053	8,205		1	633	8,838					159.5
28	791,215	8,205		1	633	8,838					157.7
29	782,377	8,205		1	633	8,838					156.0
30	773,539	8,205		1	633	8,838		1	16,669	21,100	157.0
TOTALS		246,154				18,990		265,144			
Efficiency		77.77%				MCF Used		0.6			





Outside Air Temperature						Degrees F		32			
Building							Hrs Year	729			
Estimated costs @ this temperature											
Existing Boiler		New Boiler		Savings		Combustion Air Temperature					
\$2,043.64		\$1,862.60		\$181.04		60					
System Capacity Gallons						Bldg Heat Loss /Minute					
598						7,179					
Existing Boiler											
Existing Boiler Mfgr		Model		Quantity	Input Hr High	Output Hr Low	Efficiency	Boiler Type			
Teledyne Laars		HL-1266-C-N-06-B		1	1,266,000	1,000,140	79.00%	Copper			
Prepurge Loss / Minute		Jacket Loss Minute		Water Temperature			Total Boiler HP				
203		633		160			30				
High Fire					Low Fire						
Input Minute		Output Minute		Efficiency	Input Minute		Output Minute		Efficiency		
21,100		16,669		79%					#DIV/0!		
Minute	Btu in Loop	Building Heat Loss	Prepurge	Jacket Loss	Jacket Loss	Total Loss	Output Low Fire	Output High Fire	Output	Input	Loop Temp
1	796,479	7,179		1	633	7,812					159.0
2	788,666	7,179		1	633	7,812					157.4
3	780,854	7,179		1	633	7,812					155.9
4	773,041	7,179		1	633	7,812		1	16,669	21,100	157.6
5	781,898	7,179		1	633	7,812		1	16,669	21,100	159.4
6	790,754	7,179		1	633	7,812		1	16,669	21,100	161.2
7	799,611	7,179		1	633	7,812					159.6
8	791,798	7,179		1	633	7,812					158.1
9	783,986	7,179		1	633	7,812					156.5
10	776,173	7,179		1	633	7,812					154.9
11	768,361	7,179		1	633	7,812		1	16,669	21,100	156.7
12	777,217	7,179		1	633	7,812		1	16,669	21,100	158.5
13	786,074	7,179		1	633	7,812		1	16,669	21,100	160.3
14	794,930	7,179		1	633	7,812					158.7
15	787,118	7,179		1	633	7,812					157.1
16	779,305	7,179		1	633	7,812					155.5
17	771,493	7,179		1	633	7,812		1	16,669	21,100	157.3
18	780,349	7,179		1	633	7,812		1	16,669	21,100	159.1
19	789,206	7,179		1	633	7,812		1	16,669	21,100	160.9
20	798,062	7,179		1	633	7,812					159.3
21	790,250	7,179		1	633	7,812					157.7
22	782,437	7,179		1	633	7,812					156.2
23	774,625	7,179		1	633	7,812					154.6
24	766,812	7,179		1	633	7,812		1	16,669	21,100	156.4
25	775,669	7,179		1	633	7,812		1	16,669	21,100	158.2
26	784,525	7,179		1	633	7,812		1	16,669	21,100	160.0
27	793,382	7,179		1	633	7,812		1	16,669	21,100	161.7
28	802,238	7,179		1	633	7,812					160.2
29	794,426	7,179		1	633	7,812					158.6
30	786,613	7,179		1	633	7,812					156.4
TOTALS		215,385			18,990	234,375			216,697	274,300	
Efficiency		78.52%		MCF Used		0.5					



Outside Air Temperature							Degrees F		37		
Building							Hrs Year	647			
Estimated costs @ this temperature											
Existing Boiler		New Boiler		Savings		Combustion Air Temperature					
\$1,674.24		\$1,387.27		\$286.98		60					
System Capacity Gallons							Bldg Heat Loss /Minute				
598							6,154				
Existing Boiler											
Existing Boiler Mfgr		Model		Quantity	Input Hr High	Output Hr Low	Efficiency	Boiler Type			
Teledyne Laars		HL-1266-C-N-06-B		1	1,266,000	1,000,140	79.00%	Copper			
Prepurge Loss / Minute		Jacket Loss Minute		Water Temperature			Total Boiler HP				
166		633		160			30				
High Fire					Low Fire						
Input Minute		Output Minute		Efficiency	Input Minute			Output Minute		Efficiency	
21,100		16,669		79%						#DIV/0!	
Minute	Btu in Loop	Building Heat Loss	Prepurge	Jacket Loss	Jacket Loss	Total Loss	Output Low Fire	Output High Fire	Output	Input	Loop Temp
1	796,479	6,154		1	633	6,787					159.2
2	789,692	6,154		1	633	6,787					157.8
3	782,905	6,154		1	633	6,787					156.5
4	776,118	6,154		1	633	6,787					155.1
5	769,331	6,154		1	633	6,787	1		16,669	21,100	157.1
6	779,213	6,154		1	633	6,787	1		16,669	21,100	159.1
7	789,096	6,154		1	633	6,787	1		16,669	21,100	161.1
8	798,978	6,154		1	633	6,787					159.7
9	792,191	6,154		1	633	6,787					158.3
10	785,404	6,154		1	633	6,787					157.0
11	778,617	6,154		1	633	6,787					155.6
12	771,830	6,154		1	633	6,787	1		16,669	21,100	157.6
13	781,712	6,154		1	633	6,787	1		16,669	21,100	159.6
14	791,595	6,154		1	633	6,787	1		16,669	21,100	161.6
15	801,477	6,154		1	633	6,787					160.2
16	794,690	6,154		1	633	6,787					158.8
17	787,903	6,154		1	633	6,787					157.5
18	781,116	6,154		1	633	6,787					156.1
19	774,329	6,154		1	633	6,787					154.7
20	767,543	6,154		1	633	6,787	1		16,669	21,100	156.7
21	777,425	6,154		1	633	6,787	1		16,669	21,100	158.7
22	787,307	6,154		1	633	6,787	1		16,669	21,100	160.7
23	797,189	6,154		1	633	6,787					159.4
24	790,402	6,154		1	633	6,787					158.0
25	783,615	6,154		1	633	6,787					156.6
26	776,828	6,154		1	633	6,787					155.2
27	770,042	6,154		1	633	6,787	1		16,669	21,100	157.2
28	779,924	6,154		1	633	6,787	1		16,669	21,100	159.2
29	789,806	6,154		1	633	6,787	1		16,669	21,100	161.2
30	799,688	6,154		1	633	6,787					159.3
TOTALS		184,615			18,990	203,605			200,028	253,200	
Efficiency		72.91%		MCF Used		0.5					

New Boiler						
Existing Boiler Mfgr	Model	Quantity	Input Hr High	Output Hr Low	Efficiency	Boiler Type
Triad	GPS 600 SH	2	600,000	510,000	85.00%	Steel
Prepurg Loss / Minute	Jacket Loss Minute		Water Temperature		Total Boiler HP	
51	100		145		30	
High Fire			Low Fire			
Input Minute	Output Minute	Efficiency	Input Minute	Output Minute	Efficiency	
10,000	8,500	85%	3,300	2,805	85.00%	

Minute	Btu in Loop	Building Heat Loss	Prepurg	Jacket Loss	Jacket Loss	Total Loss	Output Low Fire	Output High Fire	Output	Input	Loop Temp
1	721,809	6,154				6,154					144.3
2	715,655	6,154				6,154					143.0
3	709,501	6,154				6,154					141.8
4	703,347	6,154				6,154					140.6
5	697,193	6,154	1	51		6,205					139.3
6	690,988	6,154		1	100	6,254	1		8,500	10,000	139.8
7	693,234	6,154		1	100	6,254	1		8,500	10,000	140.2
8	695,481	6,154		1	100	6,254	1		8,500	10,000	140.7
9	697,727	6,154		1	100	6,254	1		8,500	10,000	141.1
10	699,973	6,154		1	100	6,254	1		8,500	10,000	141.6
11	702,219	6,154		1	100	6,254	1		8,500	10,000	142.0
12	704,465	6,154		1	100	6,254	1		8,500	10,000	142.5
13	706,711	6,154		1	100	6,254	1		8,500	10,000	142.9
14	708,957	6,154		1	100	6,254	1		8,500	10,000	143.4
15	711,204	6,154		1	100	6,254	1		8,500	10,000	143.8
16	713,450	6,154		1	100	6,254	1		8,500	10,000	144.3
17	715,696	6,154		1	100	6,254	1		8,500	10,000	144.7
18	717,942	6,154		1	100	6,254	1		8,500	10,000	145.2
19	720,188	6,154		1	100	6,254	1		2,805	3,300	144.5
20	716,739	6,154		1	100	6,254	1		2,805	3,300	143.8
21	713,291	6,154		1	100	6,254	1		8,500	10,000	144.3
22	715,537	6,154		1	100	6,254	1		8,500	10,000	144.7
23	717,783	6,154		1	100	6,254	1		8,500	10,000	145.2
24	720,029	6,154		1	100	6,254	1		2,805	3,300	144.5
25	716,580	6,154		1	100	6,254	1		2,805	3,300	143.8
26	713,131	6,154		1	100	6,254	1		8,500	10,000	144.2
27	715,377	6,154		1	100	6,254	1		8,500	10,000	144.7
28	717,624	6,154		1	100	6,254	1		8,500	10,000	145.1
29	719,870	6,154		1	100	6,254	1		2,805	3,300	144.4
30	716,421	6,154		1	100	6,254	1		2,805	3,300	143.2
TOTALS	184,615			2,500		187,167			178,330	209,800	
Efficiency			88.00%			MCF Used		0.4			

Outside Air Temperature						Degrees F		42			
Building							Hrs Year	560			
Estimated costs @ this temperature											
Existing Boiler		New Boiler		Savings		Combustion Air Temperature					
\$1,207.60		\$990.11		\$217.48		60					
System Capacity Gallons							Bldg Heat Loss /Minute				
598							5,128				
Existing Boiler											
Existing Boiler Mfgr		Model		Quantity	Input Hr High	Output Hr Low	Efficiency	Boiler Type			
Teledyne Laars		HL-1266-C-N-06-B		1	1,266,000	1,000,140	79.00%	Copper			
Prepurge Loss / Minute		Jacket Loss Minute		Water Temperature			Total Boiler HP				
130		633		160			30				
High Fire					Low Fire						
Input Minute		Output Minute		Efficiency				Input Minute		Output Minute	Efficiency
21,100		16,669		79%						#DIV/0!	
Minute	Btu in Loop	Building Heat Loss	Prepurge	Jacket Loss	Jacket Loss	Total Loss	Output Low Fire	Output High Fire	Output	Input	Loop Temp
1	796,479	5,128		1	633	5,761					159.4
2	790,717	5,128		1	633	5,761					158.3
3	784,956	5,128		1	633	5,761					157.1
4	779,195	5,128		1	633	5,761					155.9
5	773,434	5,128		1	633	5,761	1		16,669	21,100	158.1
6	784,342	5,128		1	633	5,761	1		16,669	21,100	160.3
7	795,249	5,128		1	633	5,761					159.2
8	789,488	5,128		1	633	5,761					158.0
9	783,727	5,128		1	633	5,761					156.8
10	777,966	5,128		1	633	5,761					155.7
11	772,205	5,128		1	633	5,761	1		16,669	21,100	157.9
12	783,112	5,128		1	633	5,761	1		16,669	21,100	160.1
13	794,020	5,128		1	633	5,761					158.9
14	788,259	5,128		1	633	5,761					157.8
15	782,498	5,128		1	633	5,761					156.6
16	776,737	5,128		1	633	5,761					155.4
17	770,975	5,128		1	633	5,761	1		16,669	21,100	157.6
18	781,883	5,128		1	633	5,761	1		16,669	21,100	159.8
19	792,791	5,128		1	633	5,761	1		16,669	21,100	162.0
20	803,699	5,128		1	633	5,761					160.9
21	797,938	5,128		1	633	5,761					159.7
22	792,176	5,128		1	633	5,761					158.5
23	786,415	5,128		1	633	5,761					157.4
24	780,654	5,128		1	633	5,761					156.2
25	774,893	5,128		1	633	5,761					155.1
26	769,131	5,128		1	633	5,761	1		16,669	21,100	157.3
27	780,039	5,128		1	633	5,761	1		16,669	21,100	159.5
28	790,947	5,128		1	633	5,761	1		16,669	21,100	161.7
29	801,855	5,128		1	633	5,761					160.5
30	796,094	5,128		1	633	5,761					158.8
TOTALS		153,846			18,990	172,836			166,690	211,000	
Efficiency		72.91%		MCF Used		0.4					



Outside Air Temperature						Degrees F		47				
Building						Hrs Year		513				
Estimated costs @ this temperature												
Existing Boiler		New Boiler		Savings		Combustion Air Temperature						
\$884.99		\$768.60		\$116.39		60						
System Capacity Gallons						Bldg Heat Loss /Minute						
598						4,103						
Existing Boiler												
Existing Boiler Mfgr		Model		Quantity	Input Hr High	Output Hr Low	Efficiency	Boiler Type				
Teledyne Laars		HL-1266-C-N-06-B		1	1,266,000	1,000,140	79.00%	Copper				
Prepurge Loss / Minute		Jacket Loss Minute		Water Temperature			Total Boiler HP					
94		633		160			30					
High Fire					Low Fire							
Input Minute		Output Minute		Efficiency	Input Minute		Output Minute		Efficiency			
21,100		16,669		79%					#DIV/0!			
Minute	Btu in Loop	Building Heat Loss	Prepurge	Jacket Loss	Jacket Loss	Total Loss	Output Low Fire	Output High Fire	Output	Input	Loop Temp	
1	796,479	4,103		1	633	4,736					159.6	
2	791,743	4,103		1	633	4,736					158.7	
3	787,007	4,103		1	633	4,736					157.7	
4	782,272	4,103		1	633	4,736					156.8	
5	777,536	4,103		1	633	4,736					155.8	
6	772,801	4,103		1	633	4,736	1		16,669	21,100	158.2	
7	784,734	4,103		1	633	4,736	1		16,669	21,100	160.6	
8	796,668	4,103		1	633	4,736					159.7	
9	791,932	4,103		1	633	4,736					158.7	
10	787,197	4,103		1	633	4,736					157.8	
11	782,461	4,103		1	633	4,736					156.8	
12	777,725	4,103		1	633	4,736					155.8	
13	772,990	4,103		1	633	4,736	1		16,669	21,100	158.2	
14	784,923	4,103		1	633	4,736	1		16,669	21,100	160.7	
15	796,857	4,103		1	633	4,736					159.7	
16	792,121	4,103		1	633	4,736					158.7	
17	787,386	4,103		1	633	4,736					157.8	
18	782,650	4,103		1	633	4,736					156.8	
19	777,914	4,103		1	633	4,736					155.9	
20	773,179	4,103		1	633	4,736	1		16,669	21,100	158.3	
21	785,112	4,103		1	633	4,736	1		16,669	21,100	160.7	
22	797,046	4,103		1	633	4,736					159.7	
23	792,310	4,103		1	633	4,736					158.8	
24	787,575	4,103		1	633	4,736					157.8	
25	782,839	4,103		1	633	4,736					156.9	
26	778,104	4,103		1	633	4,736					155.9	
27	773,368	4,103		1	633	4,736	1		16,669	21,100	158.3	
28	785,301	4,103		1	633	4,736	1		16,669	21,100	160.7	
29	797,235	4,103		1	633	4,736					159.8	
30	792,499	4,103		1	633	4,736					158.2	
TOTALS		123,077				18,990		142,067		133,352		168,800
Efficiency		72.91%				MCF Used		0.3				





Outside Air Temperature						Degrees F		52				
Building							Hrs Year	436				
Estimated costs @ this temperature												
Existing Boiler		New Boiler		Savings		Combustion Air Temperature						
\$564.12		\$460.30		\$103.82		60						
System Capacity Gallons		Bldg Heat Loss /Minute										
598		3,077										
Existing Boiler												
Existing Boiler Mfgr		Model		Quantity	Input Hr High	Output Hr Low	Efficiency	Boiler Type				
Teledyne Laars		HL-1266-C-N-06-B		1	1,266,000	1,000,140	79.00%	Copper				
Prepurge Loss / Minute		Jacket Loss Minute		Water Temperature			Total Boiler HP					
58		633		160			30					
High Fire					Low Fire							
Input Minute		Output Minute	Efficiency		Input Minute		Output Minute		Efficiency			
21,100		16,669	79%						#DIV/0!			
Minute	Btu in Loop	Building Heat Loss	Prepurge	Jacket Loss	Jacket Loss	Total Loss	Output Low Fire	Output High Fire	Output	Input	Loop Temp	
												Prepurge
1	796,479	3,077		1	633	3,710					159.8	
2	792,769	3,077		1	633	3,710					159.1	
3	789,059	3,077		1	633	3,710					158.3	
4	785,349	3,077		1	633	3,710					157.6	
5	781,639	3,077		1	633	3,710					156.8	
6	777,929	3,077		1	633	3,710					156.1	
7	774,219	3,077		1	633	3,710					155.3	
8	770,509	3,077		1	633	3,710	1		16,669	21,100	158.0	
9	783,468	3,077		1	633	3,710	1		16,669	21,100	160.6	
10	796,427	3,077		1	633	3,710					159.8	
11	792,717	3,077		1	633	3,710					159.1	
12	789,007	3,077		1	633	3,710					158.3	
13	785,298	3,077		1	633	3,710					157.6	
14	781,588	3,077		1	633	3,710					156.8	
15	777,878	3,077		1	633	3,710					156.1	
16	774,168	3,077		1	633	3,710					155.3	
17	770,458	3,077		1	633	3,710	1		16,669	21,100	157.9	
18	783,417	3,077		1	633	3,710	1		16,669	21,100	160.6	
19	796,376	3,077		1	633	3,710					159.8	
20	792,666	3,077		1	633	3,710					159.1	
21	788,956	3,077		1	633	3,710					158.3	
22	785,246	3,077		1	633	3,710					157.6	
23	781,536	3,077		1	633	3,710					156.8	
24	777,826	3,077		1	633	3,710					156.1	
25	774,116	3,077		1	633	3,710					155.3	
26	770,407	3,077		1	633	3,710	1		16,669	21,100	157.9	
27	783,366	3,077		1	633	3,710	1		16,669	21,100	160.5	
28	796,325	3,077		1	633	3,710					159.8	
29	792,615	3,077		1	633	3,710					159.1	
30	788,905	3,077		1	633	3,710					157.7	
TOTALS		92,308				18,990		111,298		100,014		126,600
Efficiency		72.91%		MCF Used		0.3						



Outside Air Temperature						Degrees F		57			
Building							Hrs Year	366			
Estimated costs @ this temperature											
Existing Boiler		New Boiler		Savings		Combustion Air Temperature					
\$315.70		\$161.96		\$153.74		60					
System Capacity Gallons							Bldg Heat Loss /Minute				
598							2,051				
Existing Boiler											
Existing Boiler Mfgr		Model		Quantity	Input Hr High	Output Hr Low	Efficiency	Boiler Type			
Teledyne Laars		HL-1266-C-N-06-B		1	1,266,000	1,000,140	79.00%	Copper			
Prepurge Loss / Minute		Jacket Loss Minute		Water Temperature			Total Boiler HP				
22		633		160			30				
High Fire					Low Fire						
Input Minute		Output Minute		Efficiency	Input Minute		Output Minute		Efficiency		
21,100		16,669		79%					#DIV/0!		
Minute	Btu in Loop	Building Heat Loss	Prepurge	Jacket Loss	Jacket Loss	Total Loss	Output Low Fire	Output High Fire	Output	Input	Loop Temp
1	796,479	2,051		1	633	2,684					160.0
2	793,794	2,051		1	633	2,684					159.5
3	791,110	2,051		1	633	2,684					159.0
4	788,426	2,051		1	633	2,684					158.4
5	785,741	2,051		1	633	2,684					157.9
6	783,057	2,051		1	633	2,684					157.3
7	780,373	2,051		1	633	2,684					156.8
8	777,689	2,051		1	633	2,684					156.2
9	775,004	2,051		1	633	2,684					155.7
10	772,320	2,051		1	633	2,684		1	16,669	21,100	158.5
11	786,305	2,051		1	633	2,684		1	16,669	21,100	161.3
12	800,290	2,051		1	633	2,684					160.8
13	797,605	2,051		1	633	2,684					160.3
14	794,921	2,051		1	633	2,684					159.7
15	792,237	2,051		1	633	2,684					159.2
16	789,552	2,051		1	633	2,684					158.6
17	786,868	2,051		1	633	2,684					158.1
18	784,184	2,051		1	633	2,684					157.6
19	781,500	2,051		1	633	2,684					157.0
20	778,815	2,051		1	633	2,684					156.5
21	776,131	2,051		1	633	2,684					155.9
22	773,447	2,051		1	633	2,684		1	16,669	21,100	158.8
23	787,431	2,051		1	633	2,684		1	16,669	21,100	161.6
24	801,416	2,051		1	633	2,684					161.0
25	798,732	2,051		1	633	2,684					160.5
26	796,048	2,051		1	633	2,684					160.0
27	793,363	2,051		1	633	2,684					159.4
28	790,679	2,051		1	633	2,684					158.9
29	787,995	2,051		1	633	2,684					158.3
30	785,310	2,051		1	633	2,684					157.2
TOTALS		61,538			18,990	80,528			66,676	84,400	
Efficiency		72.91%			MCF Used		0.2				