



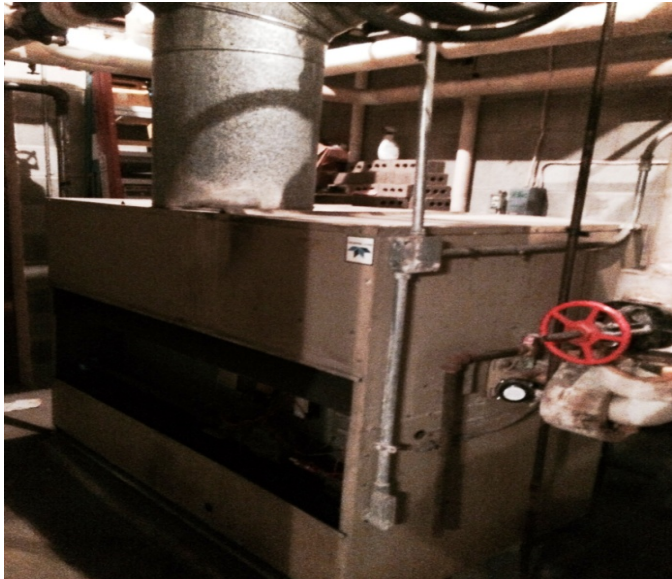
## Boiler Replacement Energy Operating Cost Study

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



**Existing Boiler**

**New Aldrich Boiler**



Contractor:

**Study Performed by Fire & Ice Heating & Cooling**

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

## Building Information

Building	Test Site	Date	8/17/20
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### Boiler Plant Information

	Existing	New
<b>Boiler Mfgr</b>	Teledyne Laars	Aldrich
Model	HL-1266-C-N-06-B	AVR 600
Input Hour High Fire	1,266,000	600,000
Input /Minute High Fire	21,100	10,000
Boiler Efficiency High Fire	79.00%	87.00%
Output Hr High Fire	1,000,140	522,000
Output/ Min High Fire	16,669	8,700
Input / Hr Low Fire		198,000
Input/ Min Low Fire		3,300
Output Hr Low Fire		172,260
Output/ Min Low Fire		2,871
Boiler Efficiency Low Fire		87.00%
Boiler HP Each	30	16
Total Boiler HP	30	31
Cu Ft Gas Hour	1,206	571
Cu Feet Gas Min	20	10
Combustion Air Hr	24,114	7,429
CFM Combustion Air	402	124
Combustion Air per cu ft gas	20	13
Prepurge Minutes		1
Boiler Quan	1	2
Total Btu Capacity	1,266,000	1,200,000
Jacket Loss Percentage	3.00%	1.00%
Jacket Loss Min/Boiler *	633	100
Boiler Type	Copper	Steel

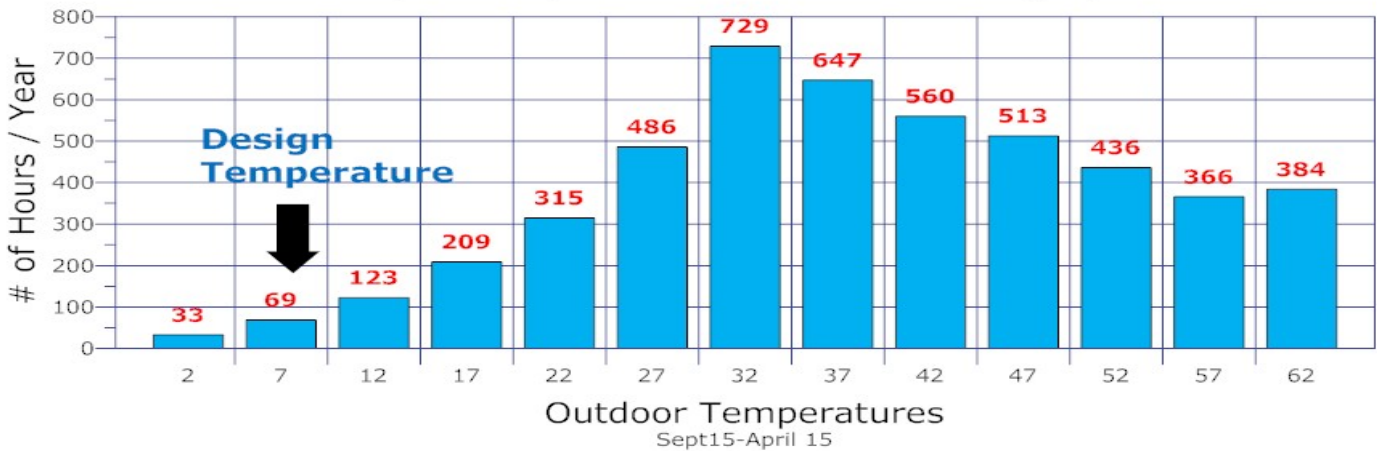
\*Jacket loss is for both existing boilers

### 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>16.41%</b>
<b>Anticipated Emissions Reduction</b>	<b>16%</b>

## Hourly Temperatures Pittsburgh, PA



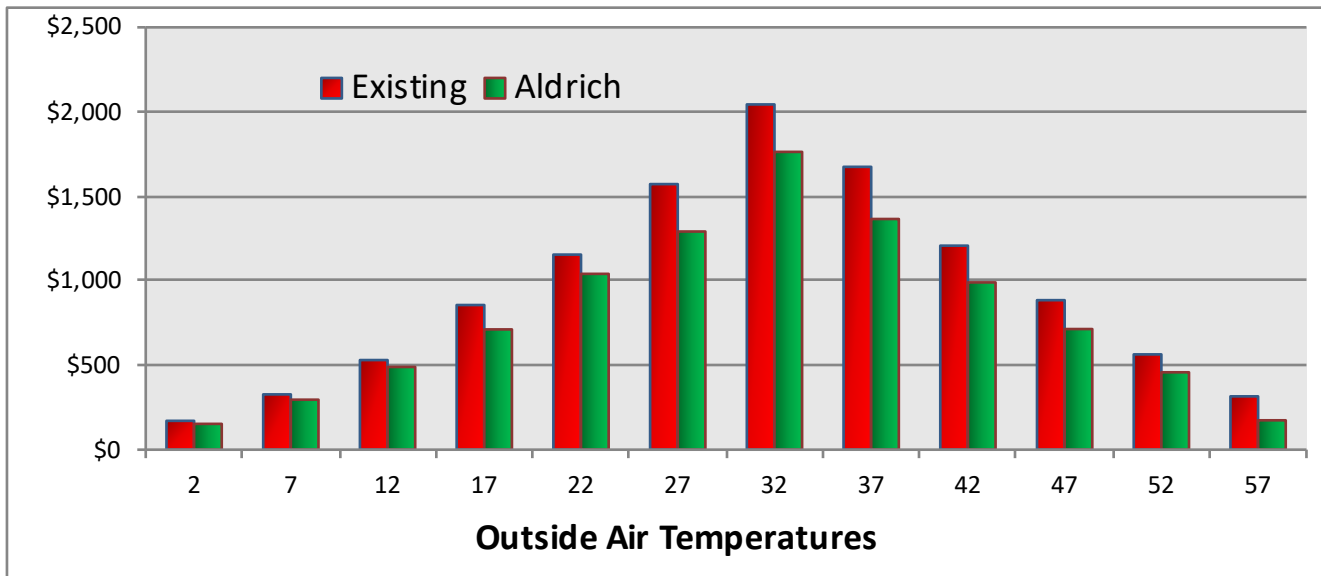
## Energy Savings Comparison

**Fuel Consumption in \$**

OA Temp	Existing Fuel Cost	Aldrich Fuel Cost	Savings
2	\$171	\$153	\$18
7	\$327	\$296	\$31
12	\$530	\$490	\$41
17	\$856	\$712	\$144
22	\$1,155	\$1,041	\$114
27	\$1,572	\$1,291	\$281
32	\$2,044	\$1,763	\$281
37	\$1,674	\$1,365	\$309
42	\$1,208	\$990	\$217
47	\$885	\$714	\$171
52	\$564	\$458	\$106
57	\$316	\$174	\$142
<b>TOTALS</b>	<b>\$11,302</b>	<b>\$9,447</b>	<b>\$1,855</b>

**Fuel Consumption in Btu's**

Saving %	OA Temp	Existing Fuel Cost	Aldrich Fuel Cost
10.53%	2	33,422,400	29,904,600
9.61%	7	64,059,600	57,904,800
7.70%	12	103,812,000	95,817,000
16.86%	17	167,576,200	139,319,400
9.87%	22	225,981,000	203,679,000
17.85%	27	307,638,000	252,720,000
13.74%	32	399,929,400	344,962,800
18.44%	37	327,640,800	267,211,000
18.01%	42	236,320,000	193,760,000
19.31%	47	173,188,800	139,741,200
18.80%	52	110,395,200	89,641,600
44.91%	57	61,780,800	34,038,000
<b>16.41%</b>	<b>TOTALS</b>	<b>2,211,744,200</b>	<b>1,848,699,400</b>



## Environmental Impact Statement

	Existing Boilers	New Boilers	Reduction Amount	Pollution Reduction %	Estimated consumption	
					Existing Boilers	New Boilers
PM	15,482,209	12,940,896	2,541,314	16%	Average Emission Reduction <b>16%</b>	2,211,744,200    1,848,699,400
Nox	203,480,466	170,080,345	33,400,122	16%		
SO2	2,211,744	1,848,699	363,045	16%		
VOC*	5,418,773,290	4,529,313,530	889,459,760	16%		
CO2	258,774,071,400	216,297,829,800	42,476,241,600	16%		
CO	88,469,768	73,947,976	14,521,792	16%		
<b>Pounds/ million Btu</b>						
Fuel	PM	Nox	SO2	VOC *	CO	CO2
Natural Gas	0.007	0.092		0.001	2.45	0.04    117.00
#2 Fuel Oil	0.084	0.448		1.122	1.81	0.033    164.00

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 Aldrich model 700 boilers.

### Assumptions

Jacket loss is continuous for existing boiler as it is not isolated. Aldrich 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  
Tel 1-866-226-8600

Pittsburgh, PA 15234

Outside Air Temperature						Degrees F		2																					
Building		Test Site				Hrs Year		33																					
Estimated costs @ this temperature																													
Existing Boiler		New Boiler		Savings		Combustion Air Temperature																							
\$170.79		\$152.81		\$17.98		60																							
System Capacity Gallons						Bldg Heat Loss /Minute																							
598						13,333																							
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																						
420		633		180			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	Prepurge	Jacket Loss	Jacket Loss	Total Loss	Output Low Fire	Output High Fire	Output	Input	Loop Temp																	
													1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
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					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																	
TOTALS		400,000				18,990	418,990			400,056	506,400																		
Efficiency			78.99%		MCF Used			1.0																					

Outside Air Temperature										Degrees F			2
New Boiler													
Existing Boiler Mfr		Model		Quantity		Input Hr High		Output Hr Low		Efficiency	Boiler Type		
Aldrich		AVR 600		2		600,000		522,000		87.00%	Steel		
Prepurge Loss / Minute			Jacket Loss Minute				Water Temperature			Total Boiler HP			
129			100				180			31			
High Fire						Low Fire							
Input Minute		Output Minute		Efficiency		Input Minute			Output Minute		Efficiency		
10,000		8,700		87%		3,300			2,871		87.00%		
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	896,038	13,333					13,333					178.0	
2	882,705	13,333					13,333					175.3	
3	869,372	13,333	1	129	1	100	13,563		1	8,700	10,000	174.3	
4	864,509	13,333			1	100	13,433		1	8,700	10,000	173.3	
5	859,776	13,333			1	100	13,433		1	8,700	10,000	172.4	
6	855,043	13,333			1	100	13,433		1	8,700	10,000	171.4	
7	850,309	13,333			1	100	13,433		1	8,700	10,000	170.5	
8	845,576	13,333	1	129	2	200	13,663		1	8,700	10,000	169.5	
9	840,613	13,333			2	200	13,533		2	17,400	20,000	170.3	
10	844,480	13,333			2	200	13,533		2	17,400	20,000	171.0	
11	848,347	13,333			2	200	13,533		2	17,400	20,000	171.8	
12	852,213	13,333			2	200	13,533		2	17,400	20,000	172.6	
13	856,080	13,333			2	200	13,533		2	17,400	20,000	173.4	
14	859,947	13,333			2	200	13,533		2	17,400	20,000	174.2	
15	863,813	13,333			2	200	13,533		2	17,400	20,000	174.9	
16	867,680	13,333			2	200	13,533		2	17,400	20,000	175.7	
17	871,547	13,333			2	200	13,533		2	17,400	20,000	176.5	
18	875,413	13,333			2	200	13,533		2	17,400	20,000	177.3	
19	879,280	13,333			2	200	13,533		2	17,400	20,000	178.1	
20	883,147	13,333			2	200	13,533		2	17,400	20,000	178.8	
21	887,013	13,333			2	200	13,533		2	17,400	20,000	179.6	
22	890,880	13,333			2	200	13,533	1	1	11,571	13,300	179.2	
23	888,918	13,333			2	200	13,533	1	1	11,571	13,300	178.8	
24	886,955	13,333			2	200	13,533		2	17,400	20,000	179.6	
25	890,822	13,333			2	200	13,533	1	1	11,571	13,300	179.2	
26	888,860	13,333			2	200	13,533	1	1	11,571	13,300	178.8	
27	886,897	13,333			2	200	13,533	1	1	11,571	13,300	178.4	
28	884,935	13,333			2	200	13,533		2	17,400	20,000	179.2	
29	888,802	13,333			2	200	13,533	1	1	11,571	13,300	178.8	
30	886,839	13,333			2	200	13,533	1	1	11,571	13,300	177.8	
TOTALS		400,000				5,100		405,359		394,197		453,100	
Efficiency			88.28%			MCF Used			0.9				

Outside Air Temperature						Degrees F		7				
Building		Test Site				Hrs Year		69				
Estimated costs @ this temperature												
Existing Boiler		New Boiler		Savings		Combustion Air Temperature						
\$327.34		\$295.89		\$31.45		60						
System Capacity Gallons						Bldg Heat Loss /Minute						
598						12,308						
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					
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	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			

Outside Air Temperature						Degrees F		7				
New Boiler												
Existing Boiler Mfr		Model		Quantity	Input Hr High	Output Hr Low		Efficiency	Boiler Type			
Aldrich		AVR 600		2	600,000	522,000		87.00%	Steel			
Prepurge Loss / Minute		Jacket Loss Minute			Water Temperature			Total Boiler HP				
138		100			175			31				
High Fire					Low Fire							
Input Minute		Output Minute		Efficiency	Input Minute		Output Minute		Efficiency			
10,000		8,700		87%	3,300		2,871		87.00%			
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	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	100	12,408	1		8,700	10,000	167.4
5	830,380	12,308			1	100	12,408	1		8,700	10,000	166.7
6	826,672	12,308			1	100	12,408	1		8,700	10,000	165.9
7	822,964	12,308	1	138	1	100	12,546	1		8,700	10,000	165.1
8	819,118	12,308			2	200	12,508	2		17,400	20,000	166.1
9	824,011	12,308			2	200	12,508	2		17,400	20,000	167.1
10	828,903	12,308			2	200	12,508	2		17,400	20,000	168.1
11	833,795	12,308			2	200	12,508	2		17,400	20,000	169.1
12	838,688	12,308			2	200	12,508	2		17,400	20,000	170.1
13	843,580	12,308			2	200	12,508	2		17,400	20,000	171.1
14	848,472	12,308			2	200	12,508	2		17,400	20,000	172.0
15	853,364	12,308			2	200	12,508	2		17,400	20,000	173.0
16	858,257	12,308			2	200	12,508	2		17,400	20,000	174.0
17	863,149	12,308			2	200	12,508	1	1	11,571	13,300	173.8
18	862,212	12,308			2	200	12,508	1	1	11,571	13,300	173.6
19	861,276	12,308			2	200	12,508	1	1	11,571	13,300	173.5
20	860,339	12,308			2	200	12,508	1	1	11,571	13,300	173.3
21	859,402	12,308			2	200	12,508	1	1	11,571	13,300	173.1
22	858,466	12,308			2	200	12,508	1	1	11,571	13,300	172.9
23	857,529	12,308			2	200	12,508	2		17,400	20,000	173.9
24	862,421	12,308			2	200	12,508	2		17,400	20,000	174.9
25	867,314	12,308			2	200	12,508	1	1	11,571	13,300	174.7
26	866,377	12,308			2	200	12,508	1	1	11,571	13,300	174.5
27	865,440	12,308			2	200	12,508	1	1	11,571	13,300	174.3
28	864,503	12,308			2	200	12,508	1	1	11,571	13,300	174.1
29	863,567	12,308			2	200	12,508	1	1	11,571	13,300	173.9
30	862,630	12,308			2	200	12,508	1	1	11,571	13,300	173.1
TOTALS		369,231				5,000	374,507			365,052	419,600	
Efficiency			88.00%		MCF Used			0.8				



Outside Air Temperature						Degrees F		12																					
Building		Test Site				Hrs Year		123																					
Estimated costs @ this temperature																													
Existing Boiler		New Boiler		Savings		Combustion Air Temperature																							
\$530.48		\$489.62		\$40.85		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	Prepurge	Jacket Loss	Jacket Loss	Total Loss	Output Low Fire	Output High Fire	Output	Input	Loop Temp																	
													1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
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																					

Outside Air Temperature							Degrees F			12		
New Boiler												
Existing Boiler Mfgr		Model		Quantity	Input Hr High		Output Hr Low		Efficiency	Boiler Type		
Aldrich		AVR 600		2	600,000		522,000		87.00%	Steel		
Prepurge Loss / Minute			Jacket Loss Minute			Water Temperature			Total Boiler HP			
107			100			170			31			
High Fire						Low Fire						
Input Minute		Output Minute		Efficiency		Input Minute		Output Minute		Efficiency		
10,000		8,700		87%		3,300		2,871		87.00%		
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	100	11,382	1		8,700	10,000	161.0
6	798,341	11,282			1	100	11,382	1		8,700	10,000	160.4
7	795,659	11,282	1	107	1	100	11,489	1		8,700	10,000	159.9
8	792,870	11,282			2	200	11,482	2		17,400	20,000	161.0
9	798,788	11,282			2	200	11,482	2		17,400	20,000	162.2
10	804,706	11,282			2	200	11,482	2		17,400	20,000	163.4
11	810,624	11,282			2	200	11,482	2		17,400	20,000	164.6
12	816,542	11,282			2	200	11,482	2		17,400	20,000	165.8
13	822,460	11,282			2	200	11,482	2		17,400	20,000	167.0
14	828,378	11,282			2	200	11,482	2		17,400	20,000	168.2
15	834,296	11,282			2	200	11,482	2		17,400	20,000	169.4
16	840,214	11,282			2	200	11,482	1	1	11,571	13,300	169.4
17	840,303	11,282			2	200	11,482	1	1	11,571	13,300	169.4
18	840,392	11,282			2	200	11,482	1	1	11,571	13,300	169.4
19	840,481	11,282			2	200	11,482	1	1	11,571	13,300	169.5
20	840,570	11,282			2	200	11,482	1	1	11,571	13,300	169.5
21	840,659	11,282			2	200	11,482	1	1	11,571	13,300	169.5
22	840,747	11,282			2	200	11,482	1	1	11,571	13,300	169.5
23	840,836	11,282			2	200	11,482	1	1	11,571	13,300	169.5
24	840,925	11,282			2	200	11,482	1	1	11,571	13,300	169.6
25	841,014	11,282			2	200	11,482	1	1	11,571	13,300	169.6
26	841,103	11,282			2	200	11,482	1	1	11,571	13,300	169.6
27	841,192	11,282			2	200	11,482	1	1	11,571	13,300	169.6
28	841,281	11,282			2	200	11,482	1	1	11,571	13,300	169.6
29	841,370	11,282			2	200	11,482	1	1	11,571	13,300	169.6
30	841,459	11,282			2	200	11,482	1	1	11,571	13,300	169.1
TOTALS		338,462				4,900		343,575		338,865		389,500
Efficiency			86.90%			MCF Used			0.8			

Outside Air Temperature							Degrees F		17			
Building		Test Site					Hrs Year		209			
Estimated costs @ this temperature												
Existing Boiler		New Boiler			Savings		Combustion Air Temperature					
\$856.31		\$711.92			\$144.39		60					
System Capacity Gallons		Bldg Heat Loss /Minute										
598		10,256										
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				
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	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				

Outside Air Temperature										Degrees F		17
New Boiler												
Existing Boiler Mfgr		Model		Quantity		Input Hr High		Output Hr Low		Efficiency		Boiler Type
Aldrich		AVR 600		2		600,000		522,000		87.00%		Steel
Prepurge Loss / Minute			Jacket Loss Minute			Water Temperature			Total Boiler HP			
96			100			165			31			
High Fire						Low Fire						
Input Minute		Output Minute		Efficiency		Input Minute		Output Minute		Efficiency		
10,000		8,700		87%		3,300		2,871		87.00%		
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	100	10,356	1		8,700	10,000	157.0
6	778,591	10,256			1	100	10,356	1		8,700	10,000	156.6
7	776,934	10,256			1	100	10,356	1		8,700	10,000	156.3
8	775,278	10,256			1	100	10,356	1		8,700	10,000	156.0
9	773,621	10,256			1	100	10,356	1		8,700	10,000	155.6
10	771,965	10,256	1	96	1	100	10,452	1		8,700	10,000	155.3
11	770,213	10,256			2	200	10,456	2		17,400	20,000	156.7
12	777,156	10,256			2	200	10,456	2		17,400	20,000	158.1
13	784,100	10,256			2	200	10,456	2		17,400	20,000	159.5
14	791,044	10,256			2	200	10,456	2		17,400	20,000	160.9
15	797,987	10,256			2	200	10,456	2		17,400	20,000	162.3
16	804,931	10,256			2	200	10,456	2		17,400	20,000	163.7
17	811,874	10,256			2	200	10,456	2		17,400	20,000	165.1
18	818,818	10,256			2	200	10,456	1	1	11,571	13,300	165.3
19	819,933	10,256			1	100	10,356	1		8,700	10,000	165.0
20	818,276	10,256			1	100	10,356	1		8,700	10,000	164.6
21	816,620	10,256			1	100	10,356	1		8,700	10,000	164.3
22	814,963	10,256			1	100	10,356	1		8,700	10,000	164.0
23	813,307	10,256			1	100	10,356	1		8,700	10,000	163.6
24	811,650	10,256			1	100	10,356	1		8,700	10,000	163.3
25	809,994	10,256			1	100	10,356	1		8,700	10,000	163.0
26	808,338	10,256			1	100	10,356	1		8,700	10,000	162.6
27	806,681	10,256			1	100	10,356	1		8,700	10,000	162.3
28	805,025	10,256			1	100	10,356	1		8,700	10,000	162.0
29	803,368	10,256			1	100	10,356	1		8,700	10,000	161.6
30	801,712	10,256			1	100	10,356	1		8,700	10,000	160.7
TOTALS		307,692				3,400		311,284		289,971		333,300
Efficiency			92.32%			MCF Used			0.7			

Outside Air Temperature						Degrees F		22																					
Building		Test Site				Hrs Year		315																					
Estimated costs @ this temperature																													
Existing Boiler		New Boiler		Savings		Combustion Air Temperature																							
\$1,154.76		\$1,040.80		\$113.96		60																							
System Capacity Gallons						Bldg Heat Loss /Minute																							
598						9,231																							
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																						
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	Prepurge	Jacket Loss	Jacket Loss	Total Loss	Output Low Fire	Output High Fire	Output	Input	Loop Temp																	
													1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
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																					

Outside Air Temperature						Degrees F		22				
New Boiler												
Existing Boiler Mfgr		Model		Quantity	Input Hr High	Output Hr Low	Efficiency	Boiler Type				
Aldrich		AVR 600		2	600,000	522,000	87.00%	Steel				
Prepurge Loss / Minute		Jacket Loss Minute			Water Temperature			Total Boiler HP				
85		100			160			31				
High Fire				Low Fire								
Input Minute		Output Minute		Efficiency	Input Minute		Output Minute		Efficiency			
10,000		8,700		87%	3,300		2,871		87.00%			
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	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	100	9,331	1		8,700	10,000	153.0
6	758,840	9,231			1	100	9,331	1		8,700	10,000	152.9
7	758,209	9,231			1	100	9,331	1		8,700	10,000	152.7
8	757,579	9,231			1	100	9,331	1		8,700	10,000	152.6
9	756,948	9,231			1	100	9,331	1		8,700	10,000	152.5
10	756,317	9,231			1	100	9,331	1		8,700	10,000	152.4
11	755,686	9,231			1	100	9,331	1		8,700	10,000	152.2
12	755,055	9,231			1	100	9,331	1		8,700	10,000	152.1
13	754,425	9,231			1	100	9,331	1		8,700	10,000	152.0
14	753,794	9,231			1	100	9,331	1		8,700	10,000	151.8
15	753,163	9,231			1	100	9,331	1		8,700	10,000	151.7
16	752,532	9,231			1	100	9,331	1		8,700	10,000	151.6
17	751,902	9,231			1	100	9,331	1		8,700	10,000	151.5
18	751,271	9,231			1	100	9,331	1		8,700	10,000	151.3
19	750,640	9,231			1	100	9,331	1		8,700	10,000	151.2
20	750,009	9,231			1	100	9,331	1		8,700	10,000	151.1
21	749,379	9,231			1	100	9,331	1		8,700	10,000	151.0
22	748,748	9,231			1	100	9,331	1		8,700	10,000	150.8
23	748,117	9,231	1	85	1	100	9,415	1		8,700	10,000	150.7
24	747,402	9,231			2	200	9,431	2		17,400	20,000	152.3
25	755,371	9,231			2	200	9,431	2		17,400	20,000	153.9
26	763,340	9,231			2	200	9,431	2		17,400	20,000	155.5
27	771,309	9,231			2	200	9,431	2		17,400	20,000	157.1
28	779,278	9,231			2	200	9,431	2		17,400	20,000	158.7
29	787,248	9,231			2	200	9,431	2		17,400	20,000	160.3
30	795,217	9,231			2	200	9,431	1	1	11,571	13,300	160.2
TOTALS		276,923				3,300	280,392			281,271	323,300	
Efficiency			85.66%			MCF Used		0.6				

Outside Air Temperature						Degrees F		27				
Building		Test Site				Hrs Year		486				
Estimated costs @ this temperature												
Existing Boiler		New Boiler		Savings		Combustion Air Temperature						
\$1,572.03		\$1,291.40		\$280.63		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	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			250,035	316,500	
Efficiency			77.77%		MCF Used			0.6				

<b>Outside Air Temperature</b>						<b>Degrees F</b>		<b>27</b>
<b>New 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>
Aldrich		AVR 600		2	600,000	522,000	87.00%	Steel
<b>Prepurge Loss / Minute</b>		<b>Jacket Loss Minute</b>			<b>Water Temperature</b>			<b>Total Boiler HP</b>
74		100			155			31
<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>
10,000		8,700		87%	3,300		2,871	87.00%

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	771,589	8,205					8,205					153.9
2	763,384	8,205					8,205					152.3
3	755,178	8,205					8,205					150.6
4	746,973	8,205	1	74			8,279					148.9
5	738,695	8,205			1	100	8,305	1		8,700	10,000	149.0
6	739,089	8,205			1	100	8,305	1		8,700	10,000	149.1
7	739,484	8,205			1	100	8,305	1		8,700	10,000	149.2
8	739,879	8,205			1	100	8,305	1		8,700	10,000	149.2
9	740,274	8,205			1	100	8,305	1		8,700	10,000	149.3
10	740,669	8,205			1	100	8,305	1		8,700	10,000	149.4
11	741,064	8,205			1	100	8,305	1		8,700	10,000	149.5
12	741,459	8,205			1	100	8,305	1		8,700	10,000	149.6
13	741,854	8,205			1	100	8,305	1		8,700	10,000	149.6
14	742,248	8,205			1	100	8,305	1		8,700	10,000	149.7
15	742,643	8,205			1	100	8,305	1		8,700	10,000	149.8
16	743,038	8,205			1	100	8,305	1		8,700	10,000	149.9
17	743,433	8,205			1	100	8,305	1		8,700	10,000	150.0
18	743,828	8,205			1	100	8,305	1		8,700	10,000	150.0
19	744,223	8,205			1	100	8,305	1		8,700	10,000	150.1
20	744,618	8,205			1	100	8,305	1		8,700	10,000	150.2
21	745,013	8,205			1	100	8,305	1		8,700	10,000	150.3
22	745,407	8,205			1	100	8,305	1		8,700	10,000	150.4
23	745,802	8,205			1	100	8,305	1		8,700	10,000	150.4
24	746,197	8,205			1	100	8,305	1		8,700	10,000	150.5
25	746,592	8,205			1	100	8,305	1		8,700	10,000	150.6
26	746,987	8,205			1	100	8,305	1		8,700	10,000	150.7
27	747,382	8,205			1	100	8,305	1		8,700	10,000	150.8
28	747,777	8,205			1	100	8,305	1		8,700	10,000	150.8
29	748,172	8,205			1	100	8,305	1		8,700	10,000	150.9
30	748,566	8,205			1	100	8,305	1		8,700	10,000	150.5
<b>TOTALS</b>		246,154				2,600	248,827			226,200	260,000	
<b>Efficiency</b>		94.67%		<b>MCF Used</b>		0.5						



Outside Air Temperature						Degrees F		32				
Building		Test Site				Hrs Year		729				
Estimated costs @ this temperature												
Existing Boiler		New Boiler		Savings		Combustion Air Temperature						
\$2,043.64		\$1,762.76		\$280.88		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	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		32				
New Boiler												
Existing Boiler Mfgr		Model		Quantity	Input Hr High	Output Hr Low	Efficiency	Boiler Type				
Aldrich		AVR 600		2	600,000	522,000	87.00%	Steel				
Prepurge Loss / Minute		Jacket Loss Minute			Water Temperature			Total Boiler HP				
62		100			150			31				
High Fire				Low Fire								
Input Minute	Output Minute	Efficiency		Input Minute	Output Minute		Efficiency					
10,000	8,700	87%		3,300	2,871		87.00%					
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	746,699	7,179					7,179					149.1
2	739,519	7,179					7,179					147.6
3	732,340	7,179					7,179					146.2
4	725,160	7,179					7,179					144.8
5	717,981	7,179	1	62			7,242					143.3
6	710,739	7,179			1	100	7,279	1		8,700	10,000	143.6
7	712,159	7,179			1	100	7,279	1		8,700	10,000	143.9
8	713,580	7,179			1	100	7,279	1		8,700	10,000	144.2
9	715,000	7,179			1	100	7,279	1		8,700	10,000	144.4
10	716,421	7,179			1	100	7,279	1		8,700	10,000	144.7
11	717,841	7,179			1	100	7,279	1		8,700	10,000	145.0
12	719,262	7,179			1	100	7,279	1		8,700	10,000	145.3
13	720,682	7,179			1	100	7,279	1		8,700	10,000	145.6
14	722,103	7,179			1	100	7,279	1		8,700	10,000	145.9
15	723,523	7,179			1	100	7,279	1		8,700	10,000	146.2
16	724,944	7,179			1	100	7,279	1		8,700	10,000	146.4
17	726,364	7,179			1	100	7,279	1		8,700	10,000	146.7
18	727,785	7,179			1	100	7,279	1		8,700	10,000	147.0
19	729,206	7,179			1	100	7,279	1		8,700	10,000	147.3
20	730,626	7,179			1	100	7,279	1		8,700	10,000	147.6
21	732,047	7,179			1	100	7,279	1		8,700	10,000	147.9
22	733,467	7,179			1	100	7,279	1		8,700	10,000	148.2
23	734,888	7,179			1	100	7,279	1		8,700	10,000	148.4
24	736,308	7,179			1	100	7,279	1		8,700	10,000	148.7
25	737,729	7,179			1	100	7,279	1		8,700	10,000	149.0
26	739,149	7,179			1	100	7,279	1		2,871	3,300	148.1
27	734,741	7,179			1	100	7,279	1		8,700	10,000	148.4
28	736,161	7,179			1	100	7,279	1		8,700	10,000	148.7
29	737,582	7,179			1	100	7,279	1		8,700	10,000	149.0
30	739,002	7,179			1	100	7,279	1		2,871	3,300	147.6
TOTALS		215,385				2,500	217,947			205,842	236,600	
Efficiency			91.03%			MCF Used		0.5				

Outside Air Temperature							Degrees F		37				
Building		Test Site					Hrs Year		647				
Estimated costs @ this temperature													
Existing Boiler		New Boiler			Savings		Combustion Air Temperature						
\$1,674.24		\$1,365.45			\$308.80		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	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					

Outside Air Temperature							Degrees F			37					
New Boiler															
Existing Boiler Mfgr		Model		Quantity		Input Hr High		Output Hr Low		Efficiency		Boiler Type			
Aldrich		AVR 600		2		600,000		522,000		87.00%		Steel			
Prepurge Loss / Minute			Jacket Loss Minute			Water Temperature			Total Boiler HP						
51			100			145			31						
High Fire						Low Fire									
Input Minute		Output Minute		Efficiency		Input Minute		Output Minute		Efficiency					
10,000		8,700		87%		3,300		2,871		87.00%					
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	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					6,154					139.3			
6	691,040	6,154	1	51			6,205					138.1			
7	684,834	6,154			1	100	6,254	1		8,700	10,000	138.6			
8	687,281	6,154			1	100	6,254	1		8,700	10,000	139.1			
9	689,727	6,154			1	100	6,254	1		8,700	10,000	139.5			
10	692,173	6,154			1	100	6,254	1		8,700	10,000	140.0			
11	694,619	6,154			1	100	6,254	1		8,700	10,000	140.5			
12	697,065	6,154			1	100	6,254	1		8,700	10,000	141.0			
13	699,511	6,154			1	100	6,254	1		8,700	10,000	141.5			
14	701,957	6,154			1	100	6,254	1		8,700	10,000	142.0			
15	704,404	6,154			1	100	6,254	1		8,700	10,000	142.5			
16	706,850	6,154			1	100	6,254	1		8,700	10,000	143.0			
17	709,296	6,154			1	100	6,254	1		8,700	10,000	143.5			
18	711,742	6,154			1	100	6,254	1		8,700	10,000	144.0			
19	714,188	6,154			1	100	6,254	1		8,700	10,000	144.5			
20	716,634	6,154			1	100	6,254	1		2,871	3,300	143.8			
21	713,252	6,154			1	100	6,254	1		8,700	10,000	144.3			
22	715,698	6,154			1	100	6,254	1		2,871	3,300	143.6			
23	712,315	6,154			1	100	6,254	1		8,700	10,000	144.1			
24	714,761	6,154			1	100	6,254	1		8,700	10,000	144.6			
25	717,207	6,154			1	100	6,254	1		2,871	3,300	143.9			
26	713,824	6,154			1	100	6,254	1		8,700	10,000	144.4			
27	716,270	6,154			1	100	6,254	1		2,871	3,300	143.7			
28	712,888	6,154			1	100	6,254	1		8,700	10,000	144.2			
29	715,334	6,154			1	100	6,254	1		2,871	3,300	143.5			
30	711,951	6,154			1	100	6,254	1		8,700	10,000	143.5			
TOTALS		184,615				2,400		187,067				179,655		206,500	
Efficiency			89.40%			MCF Used			0.4						

Outside Air Temperature						Degrees F		42				
Building		Test Site				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	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				

<b>Outside Air Temperature</b>						<b>Degrees F</b>	<b>42</b>
<b>New 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>	
Aldrich	AVR 600	2	600,000	522,000	87.00%	Steel	
<b>Prepurge Loss / Minute</b>	<b>Jacket Loss Minute</b>		<b>Water Temperature</b>		<b>Total Boiler HP</b>		
40	100		140		31		
<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>		
10,000	8,700	87%	3,300	2,871	87.00%		

Σ	Btu in Loop	Prepurge	Jacket Loss	Total Loss	Output	Input	Loop Temp
1	696,919	5,128		5,128			139.5
2	691,791	5,128		5,128			138.4
3	686,662	5,128		5,128			137.4
4	681,534	5,128		5,128			136.4
5	676,406	5,128		5,128			135.3
6	671,278	5,128	1 40	5,168			134.3
7	666,109	5,128	1 100	5,228	1 8,700	1 10,000	135.0
8	669,581	5,128	1 100	5,228	1 8,700	1 10,000	135.7
9	673,053	5,128	1 100	5,228	1 8,700	1 10,000	136.4
10	676,525	5,128	1 100	5,228	1 8,700	1 10,000	137.1
11	679,997	5,128	1 100	5,228	1 8,700	1 10,000	137.8
12	683,468	5,128	1 100	5,228	1 8,700	1 10,000	138.5
13	686,940	5,128	1 100	5,228	1 8,700	1 10,000	139.2
14	690,412	5,128	1 100	5,228	1 2,871	1 3,300	138.7
15	688,055	5,128	1 100	5,228	1 8,700	1 10,000	139.4
16	691,527	5,128	1 100	5,228	1 2,871	1 3,300	138.9
17	689,169	5,128	1 100	5,228	1 8,700	1 10,000	139.6
18	692,641	5,128	1 100	5,228	1 2,871	1 3,300	139.2
19	690,284	5,128	1 100	5,228	1 2,871	1 3,300	138.7
20	687,927	5,128	1 100	5,228	1 8,700	1 10,000	139.4
21	691,399	5,128	1 100	5,228	1 2,871	1 3,300	138.9
22	689,041	5,128	1 100	5,228	1 8,700	1 10,000	139.6
23	692,513	5,128	1 100	5,228	1 2,871	1 3,300	139.1
24	690,156	5,128	1 100	5,228	1 2,871	1 3,300	138.7
25	687,799	5,128	1 100	5,228	1 8,700	1 10,000	139.4
26	691,271	5,128	1 100	5,228	1 2,871	1 3,300	138.9
27	688,913	5,128	1 100	5,228	1 8,700	1 10,000	139.6
28	692,385	5,128	1 100	5,228	1 2,871	1 3,300	139.1
29	690,028	5,128	1 100	5,228	1 2,871	1 3,300	138.6
30	687,671	5,128	1 100	5,228	1 8,700	1 10,000	138.8
TOTALS	153,846		2,400	156,286	150,510	173,000	
Efficiency	88.93%		MCF Used	0.3			

Outside Air Temperature						Degrees F		47				
Building		Test Site				Hrs Year		513				
Estimated costs @ this temperature												
Existing Boiler		New Boiler		Savings		Combustion Air Temperature						
\$884.99		\$714.08		\$170.92		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	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				

<b>Outside Air Temperature</b>				<b>Degrees F</b>		<b>47</b>	
<b>New 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>	
Aldrich	AVR 600	2	600,000	522,000	87.00%	Steel	
<b>Prepurge Loss / Minute</b>		<b>Jacket Loss Minute</b>		<b>Water Temperature</b>		<b>Total Boiler HP</b>	
29		100		135		31	
<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>	
10,000	8,700	87%		3,300	2,871	87.00%	

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	672,029	4,103					4,103					134.7
2	667,926	4,103					4,103					133.8
3	663,824	4,103					4,103					133.0
4	659,721	4,103					4,103					132.2
5	655,619	4,103					4,103					131.4
6	651,516	4,103					4,103					130.5
7	647,413	4,103	1	29			4,132					129.7
8	643,282	4,103			1	100	4,203	1		8,700	10,000	130.6
9	647,779	4,103			1	100	4,203	1		8,700	10,000	131.5
10	652,277	4,103			1	100	4,203	1		8,700	10,000	132.4
11	656,774	4,103			1	100	4,203	1		8,700	10,000	133.3
12	661,272	4,103			1	100	4,203	1		8,700	10,000	134.2
13	665,769	4,103			1	100	4,203	1		2,871	3,300	134.0
14	664,438	4,103			1	100	4,203	1		2,871	3,300	133.7
15	663,106	4,103			1	100	4,203	1		8,700	10,000	134.6
16	667,603	4,103			1	100	4,203	1		2,871	3,300	134.3
17	666,272	4,103			1	100	4,203	1		2,871	3,300	134.1
18	664,940	4,103			1	100	4,203	1		2,871	3,300	133.8
19	663,609	4,103			1	100	4,203	1		8,700	10,000	134.7
20	668,106	4,103			1	100	4,203	1		2,871	3,300	134.4
21	666,775	4,103			1	100	4,203	1		2,871	3,300	134.2
22	665,443	4,103			1	100	4,203	1		2,871	3,300	133.9
23	664,111	4,103			1	100	4,203	1		8,700	10,000	134.8
24	668,609	4,103			1	100	4,203	1		2,871	3,300	134.5
25	667,277	4,103			1	100	4,203	1		2,871	3,300	134.3
26	665,946	4,103			1	100	4,203	1		2,871	3,300	134.0
27	664,614	4,103			1	100	4,203	1		2,871	3,300	133.7
28	663,283	4,103			1	100	4,203	1		8,700	10,000	134.6
29	667,780	4,103			1	100	4,203	1		2,871	3,300	134.4
30	666,448	4,103			1	100	4,203	1		2,871	3,300	133.6
<b>TOTALS</b>		123,077				2,300	125,406			118,494	136,200	
<b>Efficiency</b>			90.36%			<b>MCF Used</b>			0.3			



Outside Air Temperature						Degrees F		52				
Building		Test Site				Hrs Year		436				
Estimated costs @ this temperature												
Existing Boiler		New Boiler		Savings		Combustion Air Temperature						
\$564.12		\$458.07		\$106.05		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	Prepurge	Jacket Loss	Jacket Loss	Total Loss	Output Low Fire	Output High Fire	Output	Input	Loop Temp
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		52				
New Boiler												
Existing Boiler Mfgr		Model		Quantity	Input Hr High	Output Hr Low	Efficiency	Boiler Type				
Aldrich		AVR 600		2	600,000	522,000	87.00%	Steel				
Prepurge Loss / Minute		Jacket Loss Minute			Water Temperature		Total Boiler HP					
18		100			130		31					
High Fire				Low Fire								
Input Minute		Output Minute		Efficiency	Input Minute		Output Minute		Efficiency			
10,000		8,700		87%	3,300		2,871		87.00%			
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	647,139	3,077					3,077					129.8
2	644,062	3,077					3,077					129.2
3	640,985	3,077					3,077					128.6
4	637,908	3,077					3,077					128.0
5	634,831	3,077					3,077					127.4
6	631,754	3,077					3,077					126.7
7	628,677	3,077					3,077					126.1
8	625,600	3,077					3,077					125.5
9	622,523	3,077	1	18			3,095					124.9
10	619,429	3,077			1	100	3,177	1		8,700	10,000	126.0
11	624,952	3,077			1	100	3,177	1		8,700	10,000	127.1
12	630,475	3,077			1	100	3,177	1		8,700	10,000	128.2
13	635,998	3,077			1	100	3,177	1		8,700	10,000	129.3
14	641,521	3,077			1	100	3,177	1		2,871	3,300	129.3
15	641,215	3,077			1	100	3,177	1		2,871	3,300	129.2
16	640,909	3,077			1	100	3,177	1		2,871	3,300	129.2
17	640,603	3,077			1	100	3,177	1		2,871	3,300	129.1
18	640,297	3,077			1	100	3,177	1		2,871	3,300	129.0
19	639,991	3,077			1	100	3,177	1		2,871	3,300	129.0
20	639,685	3,077			1	100	3,177	1		2,871	3,300	128.9
21	639,380	3,077			1	100	3,177	1	1	8,700	10,000	130.0
22	644,903	3,077			1	100	3,177	1		2,871	3,300	130.0
23	644,597	3,077			1	100	3,177	1		2,871	3,300	129.9
24	644,291	3,077			1	100	3,177	1		2,871	3,300	129.8
25	643,985	3,077			1	100	3,177	1		2,871	3,300	129.8
26	643,679	3,077			1	100	3,177	1		2,871	3,300	129.7
27	643,373	3,077			1	100	3,177	1		2,871	3,300	129.6
28	643,067	3,077			1	100	3,177	1		2,871	3,300	129.6
29	642,761	3,077			1	100	3,177	1		2,871	3,300	129.5
30	642,455	3,077			1	100	3,177	1		2,871	3,300	129.0
TOTALS		92,308				2,100	94,426			89,436	102,800	
Efficiency			89.79%			MCF Used		0.2				

Outside Air Temperature						Degrees F		57			
Building		Test Site				Hrs Year		366			
Estimated costs @ this temperature											
Existing Boiler		New Boiler		Savings		Combustion Air Temperature					
\$315.70		\$173.93		\$141.77		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				

Outside Air Temperature										Degrees F		57
New Boiler												
Existing Boiler Mfgr		Model		Quantity	Input Hr High	Output Hr Low		Efficiency	Boiler Type			
Aldrich		AVR 600		2	600,000	522,000		87.00%	Steel			
Prepurge Loss / Minute		Jacket Loss Minute			Water Temperature			Total Boiler HP				
7		100			125			31				
High Fire					Low Fire							
Input Minute		Output Minute		Efficiency	Input Minute		Output Minute		Efficiency			
10,000		8,700		87%	3,300		2,871		87.00%			
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	622,249	2,051					2,051					125.0
2	620,198	2,051					2,051					124.6
3	618,146	2,051					2,051					124.2
4	616,095	2,051					2,051					123.8
5	614,044	2,051					2,051					123.4
6	611,992	2,051					2,051					123.0
7	609,941	2,051					2,051					122.6
8	607,890	2,051					2,051					122.1
9	605,839	2,051					2,051					121.7
10	603,787	2,051					2,051					121.3
11	601,736	2,051					2,051					120.9
12	599,685	2,051	1	7			2,058					120.5
13	597,627	2,051			1	100	2,151	1		8,700	10,000	121.8
14	604,176	2,051			1	100	2,151	1		8,700	10,000	123.1
15	610,724	2,051			1	100	2,151	1		8,700	10,000	124.4
16	617,273	2,051			1	100	2,151	1		2,871	3,300	124.6
17	617,993	2,051			1	100	2,151	1		2,871	3,300	124.7
18	618,712	2,051			1	100	2,151	1		2,871	3,300	124.9
19	619,432	2,051			1	100	2,151	1		2,871	3,300	125.0
20	620,152	2,051			1	100	2,151	1		2,871	3,300	125.2
21	620,872	2,051					2,051					124.8
22	618,820	2,051					2,051					124.3
23	616,769	2,051					2,051					123.9
24	614,718	2,051					2,051					123.5
25	612,666	2,051					2,051					123.1
26	610,615	2,051					2,051					122.7
27	608,564	2,051					2,051					122.3
28	606,513	2,051					2,051					121.9
29	604,461	2,051					2,051					121.5
30	602,410	2,051	1	7			2,058					120.6
TOTALS		61,538				800	62,352			40,455	46,500	
Efficiency			132.34%			MCF Used			0.1			