Research, Development and Demonstration of Bio-Mass Boiler for Food Industry

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1.0 INTRODUCTION

Frito-Lay is working to reduce carbon emissions from their manufacturing plants. As part of this effort, they invested in a "biomass-fired" boiler at the Topeka, Kansas, plant. Frito-Lay partnered with Burns & McDonnell Engineering, Inc. and CPL Systems, Inc., to design and construct a steam producing boiler using "carbon neutral" fuels such as wood wastes (e.g. tree bark), shipping pallets, and used rubber vehicle tires [1]. Each of these materials releases the same amount of CO_2 into the atmosphere whether they are burned to produce steam or degrade naturally over time in a landfill.

The U.S. Department of Energy (DOE) joined with Frito-Lay, Burns & McDonnell, and CPL to analyze the reductions in carbon dioxide (CO_2) emissions that result from use of biomass-fired boilers in the food manufacturing environment. DOE support provided for the data collection and analysis, and reporting necessary to evaluate boiler efficiencies and reductions in CO_2 emissions. The instrumentation and data collection for the biomass boiler demonstration and a preliminary analysis of the avoided CO_2 emissions are documented elsewhere [2, 3].

This report constitutes the third, and final, analysis of the data collected on the Frito-Lay biomass-fired boiler. The data collected have been divided into three groupings:

- The boiler "commissioning" period from September 25, 2010 through December 31, 2010 (referred to subsequently as October 2010 through December 2010),
- The first calendar year of post-commissioning operation, January 1, 2011 through December 31, 2011, and
- 18 months of post-commissioning operation, January 1, 2011 through June 30, 2012.

This report focuses on results for the two post-commissioning periods, although data are presented for the period covered in the preliminary analysis report [3], September 25, 2010 through September 30, 2011. Results are summarized in Table 1-1; with derivations of these results documented in sections 2 and 3 of this report.

Table 1-1. Biomass-Fired Boiler Data Summary

Data Period	Sep 25,2010 – Sep 30,2011	Jan 1, 2011 – Dec 31, 2011	Jan 1, 2011 – Jun 30, 2012
Biomass Consumed wood waste tire-derived fuel	29,120 tons 35 tons	30,155 tons 35 tons	43,991 tons 45 tons
Steam Produced	270×10^6 lbs	283×10^6 lbs	424×10^6 lbs
Avoided Natural Gas Consumption	398×10^6 scf	418×10^6 scf	626×10^6 scf
Increased Power Consumption	995,000 kWh	1,056,000 kWh	1,642,000 kWh
Net Reduction in CO_2 emissions	22,800 tons	23,700 tons	35,400 tons

* * * * *

2.0 BOILER PLANT OPERATION

2.1 FUEL AND ENERGY CONSUMPTION

Five to seven tractor trailer loads of wood fuel are delivered daily under a long-term fuel contract with wood generally obtained from a composting and recycling center in the Topeka area. A diesel front-end loader is used to move the fuel onto an under pile drag chain conveyor into a hopper where oversize material is removed prior to feeding onto a conveyor belt and into the boiler. The amount of wood fuel fed into the boiler was determined to be linearly correlated upon the drag chain motor power consumption; this correlation and post-commissioning measurements of drive motor power consumption are used to estimate the tonnage of wood fed into the boiler during each reporting period.

A fuel sample is taken from one delivery of wood each week to test for moisture content and to verify that the fuel satisfies "quality" criteria of the purchase contract (e.g., particle size, presence of rocks, stones, dirt, and nails). The heat content of the wood fuel was also found to be linearly dependent on its moisture content. The average of the moisture content measurements during each reporting period is used to calculate the energy content of the fuel fed into the biomass boiler.

Wood fuel consumption is summarized in Table A-2. The wood heat capacity is based on information reported for January through June 2011; the average of these values, 6,340 Btu/lb, is used for the periods not reported. Total wood fuel burned in the biomass boiler provided:

- 343,000 x 10^6 Btu of heat between September 1, 2010 and September 30, 2011,
- 283,000 x 10^6 Btu of heat between January 1, 2011 and December 31, 2011, and
- 424,000 x 10^6 Btu of heat between January 1, 2011 and June 30, 2012.

Tire derived fuel (TDF) can be used as the supplemental fuel in firing the boiler. Its intended use is relegated to mixtures with the woody biomass should the wood fuel exhibit excessively high moisture content. The need for TDF has been limited. Heat content of TDF ranges from 10,900 to 13,500 Btu/lb [2]. TDF consumption is also summarized in Table A-2. A total of 992 x 106 Btu of energy was provided by TDF.

2.2 BOILER STEAM

Use of the biomass boiler avoided emissions of CO_2 that would have occurred by using the either of the existing plant's B&W or the Nebraska boilers. Data for monthly steam output are shown in Fig. 2-1. These data indicate a low startup value and high peak during the commissioning period followed by steam production within a narrow range.

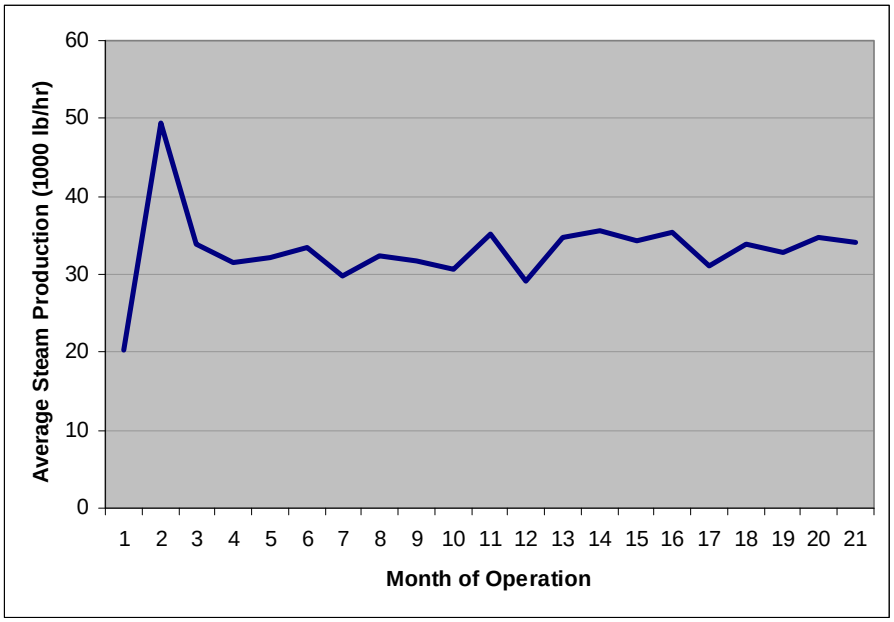

Fig. 2-1. Biomass boiler steam production.

Overall results on steam production show:

- 270,998 thousand pounds of saturated steam (324,800 MMBtu[1]), avoiding the use of 398 million scf[2] of natural gas and emissions of 23,880 tons[3] of CO_2 for the first 12 months of operation (Oct 2010 – Sept 2011),
- 283,264 thousand pounds of saturated steam (341,300 MMBtu), avoiding the use of 418 million scf of natural gas and emissions of 25,100 tons of CO_2 for 2011 (Jan 2011 – Dec 2011), and

[1] based on approximately 1,205 Btu/lb for saturated steam, varies with the steam drum pressure

[2] based on 1,020 Btu/standard cubic foot of natural gas and an average gas boiler efficiency of 80%

[3] based on 120,000 lbs $CO_2/10^6$ scf of natural gas

- 424,259 thousand pounds of saturated steam (511,200 MMBtu), avoiding the use of 626 million scf of natural gas and emissions of 37,600 tons of CO_2 for the post-commissioning period (Jan 2011 – June 2012).

2.3 ANCILLARY POWER CONSUMPTION

The biomass boiler employs electrical subsystems for fuel delivery, combustion air, and ash removal that are not required by a natural gas-fired boiler. These include large fans, motors for conveyor belts (Fig. 2-2) and an electrostatic precipitator.

Figure 2-2. Main fuel conveyor belt.

Data for the average electrical demand for the motors, fans, and precipitator and for the average daily power consumption are shown in Fig. 2-3. The demand (blue line) ranges from 108 to 143 kW and is trending upward in the later months of operation. The average daily power consumption (red line) ranges from 2,325 kWh/day to 3,452 kWh/day. It is also trending upward. EPA reported an annual average emission rate of 1,960 lbs/MWh for the region including Topeka [6].

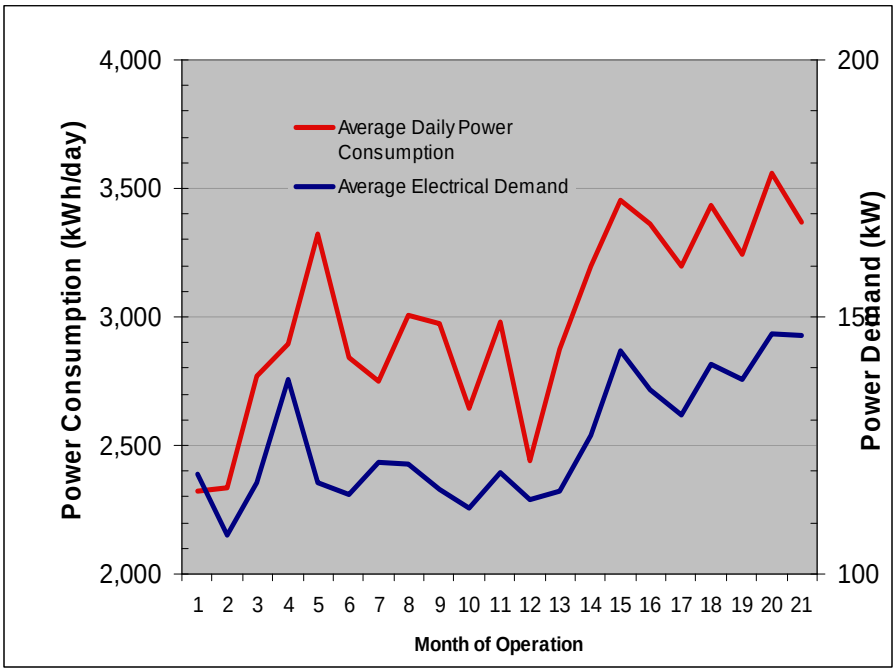

Fig. 2-3. Biomass boiler average daily power consumption and average electrical demand.

Power consumption for the biomass boiler and the associated CO_2 emissions are summarized below:

- 994,548 kWh and 970 tons of CO_2 for the first 12 months of operation (Oct 2010 – Sept 2011),
- 1,056,358 kWh and 1,040 tons of CO_2 for 2011 (Jan 2011 – Dec 2011), and
- 1,641,684 kWh and 1,610 tons of CO_2 for the post-commissioning period (Jan 2011 – June 2012).

* * * * *

3.0 ADDITIONAL SOURCES OF EMISSIONS

3.1 TRACTOR TRAILERS

Figure 3-1. Wood fuel delivery by tractor trailer.

Five to seven truck loads of wood fuel are delivered to the biomass boiler fuel yard each day (Fig. 3-1). These deliveries are made from recycle/compost facilities near Topeka. The CO_2 emissions associated with fuel deliveries are estimated assuming a tractor-trailer "efficiency" of 5.6 mpg or 91 ton-miles / gallon of diesel fuel for a 63,000 pound rig. Diesel fuel consumption[4] was thus:

- 16,000 gallons for the first 12 months of operation (Oct 2010 – Sept 2011),
- 16,570 gallons for 2011 (Jan 2011 – Dec 2011), and
- 24,170 gallons for the post-commissioning period (Jan 2011 – June 2012).

Diesel fuel averages 139,400 Btu/gallon [12] with CO_2 emissions of 164 lbs/10^6 Btu fuel input [13]; 22.8 lbs CO_2/gallon. Emissions from fuel deliveries are thus approximately:

- 180 tons for the first 12 months of operation (Oct 2010 – Sept 2011),
- 190 tons for 2011 (Jan 2011 – Dec 2011), and
- 280 tons for the post-commissioning period (Jan 2011 – June 2012).

3.2 FRONT-END LOADER

Figure 3-2. Front-end loader filling wood fuel hopper in the boiler fuel yard.

The wood fuel is moved about the biomass boiler fuel yard and put into a fuel hopper using a diesel powered front-end loader (Fig. 3-2). There is no log of fuel use or operating times for the front-end loader. Fuel consumption is approximately 1.00 gallons/hour [14]. It was assumed that the front-end loader was either in

[4] Based on an average distance of 25 miles between the fuel source and the Frito-Lay plant.

use or idling whenever the biomass boiler was operating (this estimate is known to be on the high side).

Diesel fuel consumption was thus:

- 8,380 gallons for the first 12 months of operation (Oct 2010 – Sept 2011),
- 8,640 gallons for 2011 (Jan 2011 – Dec 2011), and
- 12,830 gallons for the post-commissioning period (Jan 2011 – July 2012).

Operation of the front-end loader resulted in emissions of:

- 100 tons of CO_2 for the first 12 months of operation (Oct 2010 – Sept 2011),
- 100 tons for 2011 (Jan 2011 – Dec 2011), and
- 130 tons for the post-commissioning period (Jan 2011 – June 2012).

3.3 WOOD CHIPPER

The wood delivered to the biomass boiler fuel yard was ground, shredded, or chipped at a composting company before being sorted and shipped to Frito-Lay (Fig. 3-3). Arguably the fuel consumed in this process could be considered a source of CO_2 related to that's plant operation and not part of the biomass boiler plant's operation. Gasoline powered industrial wood chippers average approximately 7.25 lb CO_2/ton of wood processed [15]. The biomass boiler monthly wood fuel consumption was multiplied by this factor and summed for the year to estimate CO_2 emissions for chipping the wood fuel[5]:

Figure 3-3. Gas powered wood shredding and chipping equipment.

- 110 tons of CO_2 for the first 12 months of operation (Oct 2010 – Sept 2011),
- 110 tons for 2011 (Jan 2011 – Dec 2011), and
- 140 tons for the post-commissioning period (Jan 2011 – June 2012).

[5] Based on 19.4 lbs CO_2/gallon of gasoline [16]

3.4 SUMMARY OF EMISSIONS

Carbon dioxide emissions for operation of the biofuel boiler are summarized in Table 3-1. Analysis of the data for 2011 and 2012 show net reductions of 23,660 tons of CO_2 for the calendar year 2011 and 35,390 tons for the post-commissioning period January 2011 through June 2012.

Table 3.1 – Summary of CO_2 Emissions

	Preliminary Report First 12 Months	Commissioning	Post-Commissioning	
			12 Months	18 Months
	Oct '10 – Sep '11	Oct '10– Dec '10	Jan '11 – Dec '11	Jan '11 – Jun '12
Avoided Emissions natural gas	23,880	5,880	25,100	37.590
Increased Emissions electricity diesel fuel gasoline total	970 280 110 1,360	230 60 20 310	1,040 290 110 1,440	1,610 430 160 2,200
Net Reduction in CO_2 Emissions	22,520	5,570	23,660	35,390

* * * * *

4.0 AVERAGE EFFICIENCY

Table 4-1 contains monthly efficiency data that was calculated from performance data logged from the boiler data acquisition system and reported on a monthly basis. These values use published properties for saturated steam and returning boiler concentrate and also monthly average heat content for samples of wood fuel.

Table 4-1. Bio-Mass Boiler Efficiency

Reporting Period	Calculated Boiler Efficiency
October 2010	N/A[6]
November 2010	N/A
December 2010	N/A
January 2011	74.6%
February 2011	80.5%
March 2011	79.9%
April 2011	70.0%
May 2011	72.0%
June 2011	74.9%
July 2011	70.6%
August 2011	74.1%
September 2011	71.4%
October 2011	84.3%
November 2011	81.5%
December 2011	74.4%
January 2012	79.9%
February 2012	81.4%
March 2012	78.4%
April 2012	78.9%
May 2012	76.2%
June 2012	77.8%

* * * * *

[6] wood moisture content and heating value not available

5.0 CONCLUSIONS

The Frito-Lay biomass-fired boiler has resulted in significant reductions in CO_2 emissions from the Topeka production facility. The use of natural gas has been reduced by 400 to 420 million standard cubic feet per year with corresponding reductions of 24,000 to 25,000 tons of CO_2. The boiler does require auxiliary "functions," however, that are unnecessary for a gas-fired boiler. These include heavy motors and fans for moving fuel and firing the boiler, trucks and equipment for delivering the fuel and moving at the boiler plant, and chippers for preparing the fuel prior to delivery. Each of these operations requires the combustion of fossil fuels or electricity and has associated CO_2 emissions. Even after accounting for each of these auxiliary processes, however, the biomass-fired boiler results in net emission reductions of 22,500 to 23,500 tons of CO_2 per year.

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APPENDIX A: OPERATING DATA

Table A.1 – Dataset ID's and Data Collection Periods	
Dataset ID	**Data Collection Period**
October 2010	9/25/2010 through 11/2/10
November 2010	11/03/2010 through 11/30/10
December 2010	12/01/2010 through 12/31/10
January 2011	1/01/2011 through 2/1/11
February 2011	2/01/2011 through 3/1/11
March 2011	3/1/2011 through 4/4/11
April 2011	4/4/2011 through 5/2/11
May 2011	5/3/2011 through 6/1/11
June 2011	6/2/2011 through 7/4/11
July 2011	7/4/2011 through 7/29/11
August 2011	7/30/2011 through 9/1/11
September 2011	9/1/2011 through 9/30/11
October 2011	10/1/2011 through 10/31/11
November 2011	11/1/2011 through 11/30/11
December 2011	12/1/2011 through 1/04/12
January 2012	1/1/2012 through 2/01/12
February 2012	2/2/2012 through 3/01/12
March 2012	3/1/2012 through 4/01/12
April 2012	4/1/2012 through 5/01/12
May 2012	5/1/2012 through 6/01/2012
June 2012	6/2/2012 through 7/2/2012

Table A.2 – Biomass Boiler Data

Dataset ID	Steam Flow Total (kpph)	Feedwater Flow Total (kpph)	Boiler Run Hours (hrs)	Drum Pressure Average (psi)	Header Pressure Average (psi)	Boiler Feedwater Pressure Average (psi)	Boiler Feedwater Temperature (°F)
October 2010	14,950	16,002	739	320	330	365	315
November 2010	28,950	1,998	586	329	332	391	315
December 2010	23,879	1,998	706	322	325	388	319
January 2011	20,552	25,000	651	338	343	390	319
February 2011	24,551	25,476	761	326	331	387	319
March 2011	27,189	28,724	811	330	335	386	319
April 2011	18,255	18,896	611	327	332	366	319
May 2011	23,217	25,498	718	332	337	385	319
June 2011	25,968	28,290	817	315	321	351	317
July 2011	17,206	19,066	563	332	337	386	319
August 2011	28,917	31,870	822	328	333	368	319
September 2011	17,364	18,763	597	332	337	392	321
October 2011	25,929	29,427	744	328	333	373	321
November 2011	25,975	30,031	730	335	340	386	321
December 2011	28,141	31,057	819	330	335	395	321
January 2012	23,639	24,506	668	336	341	392	321
February 2012	21,326	22,096	684	334	339	396	
March 2012	24,800	25,544	732	326	331	394	
April 2010	22,427	23,186	682	329	334	379	
May 2012	25,299	26,384	727	334	339	386	
June 2012	23,504	25,328	691	331	336	367	
Totals							
Commissioning	67,779	19,998	2,031				
First year	283,264	312,098	8,644				
18 months	424,259	459,142	12,828				
To date	492,038	479,140	14,859				

Table A.3 – Biomass Boiler Fuel Input and Drag Chain Data

Dataset ID	Wood Fuel Total (tons)	Tire Derived Fuel Total (tons)	Main Fuel Drag Chain KW Total (kWh)	Main Fuel Drag Chain Run Time (hrs)	Tire Derived Fuel Metering Screw KW Total (kWh)	Tire Derived Fuel Metering Screw Run Time (hrs)
October 2010	2,071	0	935	685	0	0
November 2010	2,073	0	1,146	572	0	0
December 2010	2,073	0	1,334	666	0	0
January 2011	4,182	0	1,274	601	0.71	2.01
February 2011	2,322	8.59	1,324	709	13.70	73.99
March 2011	2,640	23.92	1,548	783	43.41	316.00
April 2011	2,003	2.40	882	579	7.70	400.00
May 2011	2,398	0	1,150	610	0	0
June 2011	2,600	0	1,269	660	0	0
July 2011	1,890	0	818	442	0	0
August 2011	2,992	0	1,324	683	0	0
September 2011	1,876	0	851	448	0	0
October 2011	2,244	0	1,127	616	0	0
November 2011	2,339	0	1,266	590	0	0
December 2011	2,669	0	1,615	669	0	0
January 2012	2,250	0	1,350	549	0	0
February 2012	1,987	0	1,289	539	0	0
March 2012	2,423	0	1,532	626	0	0
April 2012	2,169	0	1,346	555	0	0
May 2012	2,538	8.48	1,597	555	22.93	687
June 2012	2,469	1.92	1,430	580	3.85	349
Totals						
Commissioning	6,217	0.00	3,415	1,923	0	0
First year	30,155	35.12	14,448	7,390	66	792
18 months	43,991	45.52	22,992	11,440	92	1,828
To date	50,208	45.52	26,407	13,363	92	1,828

Table A.4 – Biomass Boiler Fuel Metering Screws A1, A2, B1: Power Consumption and Operating Times

Dataset ID	Fuel Metering Screw A1 KW Total (kWh)	Fuel Metering Screw A1 Run Time (hrs)	Fuel Metering Screw A2 KW Total (kWh)	Fuel Metering Screw A2 Run Time (hrs)	Fuel Metering Screw B1 KW Total (kWh)	Fuel Metering Screw B1 Run Time (hrs)
October 2010	219	709	166	716	1,737	720
November 2010	218	582	168	583	1,432	584
December 2010	241	706	185	706	1,670	706
January 2011	211	621	167	621	1,484	622
February 2011	275	746	210	747	1,713	744
March 2011	316	807	245	807	1,897	807
April 2011	231	594	175	594	1,392	595
May 2011	268	704	217	704	1,632	704
June 2011	288	817	238	816	1,886	812
July 2011	228	539	188	540	1,283	540
August 2011	353	820	301	821	1,950	820
September 2011	245	570	197	569	1,363	571
October 2011	290	742	230	743	1,734	744
November 2011	285	695	221	696	1,613	695
December 2011	292	816	238	817	1,891	815
January 2012	268	669	221	669	1,572	669
February 2012	230	673	183	673	1,566	673
March 2012	255	727	214	727	1,686	727
April 2010	218	660	186	661	1,520	662
May 2012	274	723	241	723	1,679	723
June 2012	261	671	226	671	1,535	675
Totals						
Commissioning	678	1,997	519	2,005	4,839	2,010
First year	3,282	8,471	2,627	8,475	19,838	8,469
18 months	4,788	12,594	3,898	12,599	29,396	12,598
To date	5,466	14,591	4,417	14,604	34,235	14,608

Table A.5 – Biomass Boiler Fuel Metering Screws B2, C1, C2: Power Consumption and Operating Times

Dataset ID	Fuel Metering Screw B2 KW Total (kWh)	Fuel Metering Screw B2 Run Time (hrs)	Fuel Metering Screw C1 KW Total (kWh)	Fuel Metering Screw C1 Run Time (hrs)	Fuel Metering Screw C2 KW Total (kWh)	Fuel Metering Screw C2 Run Time (hrs)
October 2010	232	720	260	709	277	693
November 2010	246	584	303	576	308	575
December 2010	272	706	358	702	353	720
January 2011	251	621	293	611	300	590
February 2011	239	745	263	749	266	748
March 2011	270	806	319	805	291	805
April 2011	187	595	241	594	313	594
May 2011	214	701	257	704	274	705
June 2011	216	812	291	814	298	814
July 2011	146	540	241	539	261	539
August 2011	274	821	381	821	407	821
September 2011	171	569	249	529	278	569
October 2011	216	744	236	784	249	744
November 2011	210	695	282	697	297	697
December 2011	242	815	313	818	323	818
January 2012	209	668	280	668	285	668
February 2012	188	674	244	673	252	673
March 2012	210	732	288	727	296	726
April 2010	190	656	243	661	243	660
May 2012	235	724	302	722	305	722
June 2012	229	674	279	672	290	670
Totals						
Commissioning	750	2,010	921	1,987	938	1,988
First year	2,636	8,464	3,366	8,465	3,557	8,444
18 months	3,897	12,592	5,002	12,588	5,228	-87,319
To date	4,647	14,602	5,923	14,575	6,166	–85,331

Table A.6 – Biomass Boiler Fan Power Consumption and Operating Times

Dataset ID	Forced Draft Fan KW Total (kWh)	Forced Draft Fan Run Time (hrs)	Induced Draft Fan KW Total (kWh)	Induced Draft Fan Run Time (hrs)	OFA Fan KW Total (kWh)	OFA Fan Run Time (hrs)
October 2010	0	0	41,485	759	36,231	723
November 2010	0	0	31,574	605	22,741	605
December 2010	0	0	43,188	711	31,223	710
January 2011	6,856	2,680	44,863	648	29,800	644
February 2011	2,472	761	44,348	761	33,354	761
March 2011	2,654	812	46,406	811	34,046	811
April 2011	2,298	610	36,552	627	26,635	610
May 2011	2,780	718	42,575	719	31,732	719
June 2011	3,288	817	44,901	816	35,882	817
July 2011	2,267	563	28,746	568	24,731	563
August 2011	3,259	822	42,611	823	41,556	822
September 2011	2,551	597	30,464	597	26,965	574
October 2011	2,829	744	40,573	744	33,426	744
November 2011	3,556	730	48,901	733	32,140	707
December 2011	4,538	819	60,083	820	44,017	819
January 2012	3,715	668	46,101	668	34,507	669
February 2012	3,353	684	43,164	684	33,590	675
March 2012	3,879	732	49,841	732	37,514	732
April 2010	3,802	682	46,513	683	34,315	682
May 2012	5,212	727	55,973	727	35,648	727
June 2012	5,621	691	53,563	691	34,129	813
Totals						
Commissioning	0	0	116,247	2,075	90,195	2,038
First year	39,348	10,673	511,023	8,667	394,284	8,591
18 months	64,930	14,857	806,178	12,852	603,987	12,889
To date	64,930	14,857	922,425	14,927	694,182	14,927

Table A.7 – Babcock & Wilcox Boiler Data

Dataset ID	Babcock & Wilcox Fuel Flow Total (kscfh)	Babcock & Wilcox Run Hours Total (hrs)	Babcock & Wilcox Boiler Low Turndown Hours (hrs)	Babcock & Wilcox Forced Draft Fan KW Total (kWh)
October 2010	14,182	739	262	15,850
November 2010	14,182	739	473	15,850
December 2010	14,182	739	681	15,850
January 2011	9,992	1,920	513	30,961
February 2011	2,110	748	681	11,885
March 2011	647	805	795	11,724
April 2011	5,847	596	401	10,966
May 2011	4,169	706	576	11,172
June 2011	1,693	817	751	11,869
July 2011	1,758	539	514	8,496
August 2011	878	822	795	11,850
September 2011	5,343	572	525	11,306
October 2011	698	743	726	10,607
November 2011	1,000	697	674	10,664
December 2011	576	820	800	11,594
January 2012	229	668	664	9,413
February 2012	834	674	666	9,975
March 2012	1,363	726	682	11,286
April 2010	1,886	661	604	10,277
May 2012	1,618	724	660	10,775
June 2012	3,772	675	642	11,938
Totals				
Commissioning	42,546	2,217	1,416	47,550
First year	34,711	9,785	7,751	153,094
18 months	44,413	13,913	11,668	216,758
To date	86,959	16,130	13,084	264,308

APPENDIX B – BIOMASS BOILER ENERGY INPUTS

Table B.1 –. Biomass Boiler Energy Inputs: Wood, Tire-Derived Fuel, and Feedwater

	Wood Fuel			Tire-Derived Fuel		Boiler Feedwater				
	Consumption (tons)	Specific Heat[1] (Btu/lbm)	Heat Content (MMBtu[2])	Consumption (tons)	Heat Content[3] (MMBtu)	Feedwater Flow (thousand lbs)	Temperature (°F)	Specific Heat (Btu/lbm)	Heat Content (MMBtu)	Total Heat Input (MMBtu)
October 2010	2,071	6,340[4]	26,300	0	0	16,002	315	285.4	4,567	30,867
November 2010	2,073	6,340[4]	26,300	0	0	1,998	319	289.6	570	26,870
December 2010	2,091	6,340[4]	26,500	0	0	1,998	319	289.6	579	27,079
Subtotal 2010	6,235	---	79,100	0	0	19,998	---	---	5,716	84,816
January 2011	2,091	6,200	25,900	0.213	4.6	25,000	319	289.6	7,239	33,144
February 2011	2,322	6,280	29,200	8.592	187.3	25,476	319	289.6	7,377	36,764
March 2011	2,640	6,090	32,200	23,915	521.3	28,724	319	289.6	8,317	41,038
April 2011	2,003	6,460	25,900	2.397	52.3	18,896	319	289.6	5,471	31,423
May 2011	2,398	6,560	31,500	0	0	25,498	317	287.5	7,383	38,883
June 2011	2,600	6,450	33,500	0	0	28,290	319	289.6	8,133	41,633
July 2011	1,890	6,340[4]	24,000	0	0	19,066	319	289.6	5,521	29,521
August 2011	2,992	6,340[4]	37,900	0	0	31,870	319	289.6	9,228	47,128
September 2011	1,876	6,340[4]	23,800	0	0	18,763	321	291.6	5,472	29,272

October 2011	2,244	6,340[4]	28,450	0	0	29,427	321	291.6	8,582	37,032
November 2011	2,339	6,340[4]	29,654	0	0	30,031	321	291.6	8,758	38,412
December 2011	2,669	6,340[4]	33,838	0	0	31,057	321	291.6	9,057	42,895
Subtotal 2011	28,064	---	355,842	35.117	765.5	312,098	---	---	90,538	447,145
January 2012	2,250	6,340[4]	28,526	0	0	24,506	321	291.6	7,147	35673
February 2012	1,987	6,340[4]	25,191	0	0	22,096	319	289.6	6,398	31,589
March 2012	2,423	6,340[4]	30,719	0	0	25,544	319	289.6	7,396	38,116
April 2012	2,169	6,340[4]	27,499	0	0	23,186	319	289.6	6,714	34,213
May 2012	2,538	6,340[4]	32,177	8.479	184.8	26,384	319	289.6	7,640	40,002
June 2012	2,469	6,340[4]	31,302	1.924	41.943	25,328	319	289.6	7,334	38,678
Subtotal 2012	13,836	6,340[4]	175,414	10.403	226.785	147,044	319	289.6	42,578	218,270

[1]recorded manually at the site from measurements of fuel moisture content taken randomly at the time of delivery; specific heat = 7900 x (1-% moisture content)
[2]Million Btu
[3]based on 10,900 Btu/lb for TDF
[4]Average of reported values for Jan. 2011 through June 2011

APPENDIX C – BIOMASS BOILER ENERGY OUTPUT

Table C.1 – Biomass Boiler Energy Output

Data ID	Steam Produced (thousand lbs)	Header Pressure (psig)	Specific Heat[1] (Btu/lb)	Steam Output (MMBtu[2])
October 2010	14,950	330.0	1,204.9	18,000
November 2010	28,950	332.0	1,204.9	34,900
December 2010	23,879	325.0	1,204.8	28,800
Subtotal 2010	67,779	---	---	81,700
January 2011	20,552	343.0	1,205.1	24,800
February 2011	24,551	331.0	1,204.9	29,600
March 2011	27,189	335.0	1,205.0	32,800
April 2011	18,255	332.1	1,204.9	22,000
May 2011	23,217	336.9	1,205.0	28,000
June 2011	25,968	320.5	1,204.7	31,300
July 2011	17,206	337.5	1,205.0	20,700
August 2011	28,917	332.7	1,204.9	34,800
September 2011	17,364	336.6	1,205.0	20,900
October 2011	25,929	333.4	1,205.1	31,200
November 2011	25,975	340.2	1,205.2	31,300
December 2011	28,141	335.4	1,205.2	31,900
Subtotal 2011	283,264	---	---	339,300
January 2012	23,639	340.7	1,205.2	28,500
February 2012	21,326	339.2	1,205.2	25,700
March 2012	24,800	331.4	1,205.1	29,900
April 2012	22,427	334.1	1,205.1	27,000

May 2012	25,299	334.0	1,205.2	30,500
June 2012	23,504	330.9	1,205.2	28,300
Subtotal 2012	140,995			169,900
Total	492,038	---	---	590,900

[1]Calculated for saturated vapor at the steam header pressure using REFPROP from the National Institute of Standards and Technology
[2]Million Btu

APPENDIX D – BIOMASS BOILER EFFICIENCY

Table D.1 – Biomass Boiler Efficiency				
Data ID	Steam Output (MMBtu[1])	Fuel & Feed-Water Input (MMBtu)	Calculated Efficiency	Reported Efficiency
September 2010	18,000	30,867	58.3%	75%
November 2010	34,900	26,870	129.9%	80%
December 2010	28,800	27,079	106.4%	76%
Subtotal 2010	81,700	84,816		
January 2011	24,800	33,144	74.8%	69%
February 2011	29,600	36,764	80.5%	65%
March 2011	32,800	41,038	79.9%	61%
April 2011	22,000	31,423	70.0%	63%
May 2011	28,000	38,883	72.0%	68%
June 2011	31,300	41,633	75.2%	54%
July 2011	20,700	29,521	70.1%	67%
August 2011	34,800	47,128	73.8%	66%
September 2011	20,900	29,272	71.4%	62%
October 2011	31,200	37,032	84.3%	79%
November 2011	31,300	38,412	81.5%	73%
December 2011	33,900	42,895	79.0%	72%
Subtotal 2011	341,300	447,145	76.3%	----
January 2012	28,500	35,673	79.9%	72%
February 2012	25,700	31,589	81.4%	80%
March 2012	29,900	38,116	78.4%	66%
April 2012	27,000	34,213	78.9%	65%

May 2012	30,500	40,002	76.2%	65.3%
June 2012	28,300	38,678	73.2%	62.0%
Subtotal 2012	169,900	218,271	73.2%	
Total	590,900	750,232	78.8%	
[1]Million Btu				

AMPAC FINE CHEMICALS BYPRODUCT FUEL AND CHP FEASIBILITY STUDY

Award DE-FC26-08NT05869 Task 2.3

Final Technical Report
September 30, 2010 through March 31, 2012

Authors:
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March 20, 2012

Prepared by

Burns & McDonnell Engineering Company, Inc.

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March 20, 2012

Mr. Paul Kane
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AMPAC Fine Chemicals
P.O. Box 1718
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AMPAC Fine Chemicals Byproduct Fuel and CHP Feasibility Study
Burns & McDonnell Project No. 63327

Dear Mr. Kane,

Burns & McDonnell is pleased to present this report on the AMPAC Fine Chemicals (AFC) Byproduct Fuel and Combined Heat and Power (CHP) Feasibility Study (the Study) completed on behalf of the U.S. Department of Energy/National Energy Technology Laboratory (U.S. DOE/NETL), AMPAC Fine Chemicals LLC (AFC) and the Sacramento Municipal Utility District (SMUD). This report was prepared and is submitted pursuant to the Agreement between U.S. DOE/NETL, AFC, SMUD and Burns & McDonnell dated.

This report describes the approach and assumptions used in the analyses completed for SMUD and it presents the results of the Study completed, including conclusions and recommendations.

The results of the study are outlined in the following sections:

- Introduction & Executive Summary
- Description of Existing Plant
- Site Energy Requirements
- Waste Fuels Analysis
- CHP Options, Capital Cost, and Operation and Maintenance Costs
- Economic Analysis

Based on the assessment completed by Burns & McDonnell, a number of conclusions and recommendations were developed and are provided in the Executive Summary section of the report. Burns & McDonnell appreciates the opportunity to work with SMUD and AFC.
We are grateful for the cooperation and assistance we received. Please call us with any questions or comments you may have regarding this report.

Sincerely,

Duane DeRaad, LEED AP
Project Manager
BURNS & MCDONNELL;

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

SUMMARY

The U.S. Department of Energy/National Energy Technology Laboratory (U.S. DOE/NETL), AMPAC Fine Chemicals (AFC) and Sacramento Municipal Utility District (SMUD) retained Burns & McDonnell to determine the technical and economic feasibility of recovering industrial chemical by product into fuel for a Combined Heat and Power (CHP) Plant. The assessment considers the design, installation and operation of the required fuel processing system and a CHP plant at AFC's existing pharmaceutical plant located in Folsom, CA. The installation of these systems would allow electricity to be generated from the byproduct fuel stream and consumed on-site via a prime mover technology such as a gas fired combustion turbine generator, while the exhaust heat from the prime mover is used for steam production in a heat recovery steam generator (HRSG). The steam and electricity generated in the CHP plant would reduce AFC's need to operate the existing gas fired boilers and minimize grid electric purchases from SMUD while minimizing the economic and environmental impact of chemical byproduct disposal. This would reduce AFC's total annual operating costs while offering both financial and environmental benefits to both SMUD and AFC.

OBJECTIVE

The objective of this study was to perform a technical and economic evaluation of using AMPAC's chemical byproducts as fuel for a CHP plant to serve the steam and electrical requirements of AFC's pharmaceutical manufacturing operations in Folsom, CA. AFC currently operates three distributed steam boiler plants to meet its needs. This study identified the fuel byproduct recovery process and associated equipment along with applicable CHP prime mover technology and then evaluated the overall economic performance obtained from building, owning, and operating the systems to serve AFC operations.

APPROACH

Burns & McDonnell's approach to completing the Study included the following major activities in order to identify, evaluate, and select a recommended CHP configuration and equipment technology for AFC's site utility needs.

1. Assessment of industrial process-byproducts at the selected site to determine suitability for use as a fuel source in an on-site energy system.

2. Assessment of requirements for industrial process-byproduct treatment and conversion into a usable fuel source.
3. Assessment of ability to use process-byproduct fuel in selected turbine, engine and boiler applications.
4. Assessment of issues related to process-byproduct fuel storage and handling equipment for delivering fuel to an on-site energy system.
5. Assessment of emission control requirements.
6. Assessment of capital cost, operation and maintenance (O&M) cost, and life-cycle cost for the process-byproduct conversion equipment and on-site energy system.
7. Assessment of control system requirements for the on-site energy system.
8. Preparation of preliminary heat and material balance and a process flow diagram (PFD) for a process-byproduct fueled on-site energy system.
9. Evaluate and analyze the existing base case AFC site and utility plant equipment in order to determine potential locations and configurations for the proposed CHP plants.
10. Evaluate and analyze the existing base case AFC site heating loads, electric loads, and utility costs.
11. Identify the best CHP prime mover technologies based on the existing heating and electric loads and the available byproduct fuel stream.
12. Select the best CHP prime mover technologies for each of the following proposed configurations:
    a. A single new central CHP plant located at the south site which would be sized to serve the total AFC minimum thermal load of 12,500 lb/hr. This would require the addition of new steam and condensate lines to connect the north site and south site systems.
    b. A single new central CHP plant located at the south site utilizing microturbines sized to serve as much of the minimum thermal load as possible. No site interconnection steam piping required.
    c. A single new central CHP plant located at the south site utilizing reciprocating engines sized to serve as much of the minimum thermal load as possible. No site interconnection steam piping required.
13. Develop performance estimates and general process flow diagrams for each of the proposed configurations.
14. Develop capital cost estimates for each of the proposed configurations.
15. Develop annual operation and maintenance costs for each of the proposed configurations.
16. Evaluate the economics of each proposed CHP configurations.

ANALYSIS

Burns & McDonnell obtained the byproduct stream components and annual quantities from AFC. The chemicals were analyzed to determine heating value, combustibility and contaminants present. The byproducts that provided promising fuel characteristics were identified and the process requirements for converting them into acceptable fuels were developed. The byproduct fuel characteristics were provided to a fuel process equipment, a combustion turbine and an industrial boiler burner manufacturer to solicit an opinion on the compatibility of the byproduct fuels with the manufacturer's technology. Based on the resulting information, the available byproduct fuel quantities and the facility utility loads, CHP prime movers were selected for consideration. In each of the configurations considered, the waste heat recovered from the prime mover's exhaust would be used to meet as much of the minimum thermal load for the site under consideration as possible. Detailed descriptions for each of the fuel byproduct process equipment and the CHP configurations are presented in Section 4 of this report. A summary of each configuration's technical performance assumptions, project capital costs and operation and maintenance cost assumptions is presented in Table ES-1.

RESULTS

Burns & McDonnell prepared an economic analysis of each of the proposed CHP configurations to determine which one provided the highest net present value (NPV) benefit. The analysis assumed that AFC would own and operate the CHP plant. When compared with the existing facility, the CHP plant would provide benefits related to steam, electricity, and chemical waste disposal costs to offset the capital cost and operating cost of the project. The steam sales would be in the form of a reduction in the amount of steam generated by natural gas fired boilers or a natural gas offset. The electric sales would be in the form of a reduction in electricity purchased from Aerojet. Depending on the scenario, electric sales to SMUD's grid would also be available when the CHP plant generated more electricity than AFC required. The waste-to-fuel capabilities of the proposed plant are estimated to significantly reduce the volume of chemical byproducts, thereby substantially mitigating waste disposal costs. Burns & McDonnell assumed that AFC would fund the capital cost of the project with 100 percent debt financing and a 10 percent federal investment tax credit. Burns & McDonnell summarized the results of the economic analysis in the form of pro forma cash flow statements. The NPV summary of the options is presented in Table ES-2.

Table ES-1: CHP Plant Configurations Assumptions

Configuration	Option 1			Option 2			Option 3		
Project Description	Single CHP Plant Located at South Site - Supplying Steam to North and South Sites			Single CHP Plant Located at South Site - No Steam Interconnection			Single CHP Plant Located at South Site - No Steam Interconnection		
Site	North Site	South Site	Total	North Site	South Site	Total	North Site	South Site	Total
Estimated Average Electrical Load (kW)	1,500	1,500	3,000		1,500	1,500		1,500	1,500
Maximum CHP Electric Generation (kW)	5,000	5,000	5,000		5,000	5,000		5,000	5,000
Minimum Steam Load (lb/hr)	5,500	7,000	12,500		7,000	7,000		7,000	7,000
Average Steam Load (lb/hr)	8,000	15,000	23,000		15,000	15,000		15,000	15,000
Max Steam Load (lb/hr)	12,000	25,000	37,000		25,000	25,000		25,000	25,000
Power Generation Technology		Combustion Turbine	Combustion Turbine		Microturbine	Microturbine		Reciprocating Engine	Reciprocating Engine
Manufacturer		Solar Turbines	Solar Turbines		Capstone	Capstone		GE	GE
Prime Mover		Mercury 50	Mercury 50		C200 x 9	C200 x 9		Jenbacher JMS 416	Jenbacher JMS 416
Number of Units		1	1		1	1		2	2
Gross Power Generation per Unit (kW)		4,419	4,419		1,800	1,800		1,137	1,137
Aux Load per Unit (kW)		-40	-40		-36	-36		-23	-23
Net Power Generation per Unit (kW)		4,379	4,379		1,764	1,764		1,114	1,114
Fuel Input per Unit LHV (MMBtu/hr)		40.10	40.10		17.00	17.00		9.78	9.78
Fuel Input per Unit HHV (MMBtu/hr)		44.11	44.11		18.70	18.70		10.75	10.75
Prime Mover Heat Rate HHV (Btu/kWh)		10,073	10,073		10,601	10,601		9,651	9,651
Total Net Power Generation (kW)		4,379	4,379		1,764	1,764		2,229	2,229
Total Prime Mover Fuel Input HHV (MMBtu/hr)		44.1	44.1		18.7	18.7		21.5	21.5
Federal Investment Tax Credit (%)		10%	10%		10%	10%		10%	10%
Steam Generation Technology		HRSG	HRSG		HRSG	HRSG		HRSG	HRSG
Number of Units		1	1		1	1		2	2
Steam Generation per Unit (lb/hr)		14,376	14,376		6,300	6,300		2,231	2,231
Total Steam Generation (lb/hr)		14,376	14,376		6,300	6,300		4,462	4,462
Total Project Capital Cost ($)		$ 16,488,500	$ 16,488,500		$ 11,972,800	$ 11,972,800		$ 10,032,100	$ 10,032,100
SGIP Incentive ($)		$ (875,000)	$ (875,000)		$ (691,000)	$ (691,000)		$ (529,100)	$ (529,100)
Investment Tax Credit ($)		$ (1,648,900)	$ (1,648,900)		$ (1,197,300)	$ (1,197,300)		$ (1,003,200)	$ (1,003,200)
Net Project Capital Cost ($)		$ 13,964,600	$ 13,964,600		$ 10,084,500	$ 10,084,500		$ 8,499,800	$ 8,499,800
Prime Mover Maintenance Cost ($/unit)		$ 430,900	$ 430,900		$ 301,500	$ 301,500		$ 137,100	$ 137,100
Number of Units		1	1		1	1		2	2
Total Prime Mover Maintenance Cost ($)		$ 430,900	$ 430,900		$ 301,500	$ 301,500		$ 274,200	$ 274,200
Additional Managers		0	0		0	0		0	0
Additional Operators		0	0		0	0		0	0
Additional Maintenance Techs.		1	1		1	1		1	1

Table ES-2: CHP Plant Configurations – 2012 Leveraged Net Present Value Summary

	Option 1 Combustion Turbine	Option 2 Microturbines	Option 3 Reciprocating Engines
Total Net Cash Flow	$ 15,511,500	$ 12,874,100	$ 13,939,700
Discount Rate	15.00%	15.00%	15.00%

Burns & McDonnell also examined the options from an unleveraged position, assuming the projects were funded through equity rather than debt. This approach eliminates some economic distortion that can result when examining leveraged NPVs. The unleveraged results are presented in Table ES-3.

Table ES-3: CHP Plant Configurations – 2012 Unleveraged Net Present Value Summary

	Option 1 Combustion Turbine	Option 2 Microturbines	Option 3 Reciprocating Engines
Unleveraged 2014 NPV	$ 8,855,900	$ 8,067,500	$ 9,888,600
Discounted Payback Period	3 Years 5 Mos	3 Years 2 Mos	2 Years 9 Mos
Modified Internal Rate of Return (MIRR)	17.61%	18.14%	19.18%

As noted in Tables ES-2 and ES-3, all options are anticipated to create substantial economic value to AFC. The precise ranking of the options depends on whether or not debt or equity funding is considered in the NPV analysis. However, in determining which project(s) merit further diligence and development, factors beyond economic results may be considered. These factors are described in Section 7 of this report. Table ES-4 scores projects on the basis of economic results, risk, and other factors.

Table ES-4: Scoring Matrix – Leveraged NPV

Metric	Leveraged Economic Assessment	Proven Technology	Regulatory Incentives	Environmental Permitting	Commodity Pricing	Power Reliability	Score
Maximum Potential Score	10	5	5	5	5	5	35
Option 1: Combustion Turbine	10	3	3	4	3	5	28
Option 2: Microturbine	8	5	5	4	5	3	30
Option 3: Reciprocating Engine	9	3	5	3	5	3	28

Based on the scoring matrix presented in Table ES-4, Option 2 with the Capstone microturbines offers the best balance of economic value, risk, and other less tangible factors, and merits further diligence and development.

STATEMENT OF LIMITATIONS

In completing this study, information provided by AFC, SMUD and other sources was utilized by Burns & McDonnell to make certain assumptions with respect to conditions that may exist in the future. While Burns & McDonnell believes the assumptions made are reasonable for the purposes of this study, no representation is made that the conditions assumed will, in fact, occur. In addition, while Burns & McDonnell has no reason to believe that the information provided by AFC, SMUD and other parties, and on which Burns & McDonnell has relied, is inaccurate in any material respect, Burns & McDonnell has not independently verified such information and cannot guarantee its accuracy or completeness. To the extent that actual future conditions differ from those assumed herein or from the information provided by AFC, SMUD, and other parties the actual results will vary from those projected.

* * * * *

SECTION 1.0

DESCRIPTION OF EXISTING PLANT

1.0 DESCRIPTION OF EXISTING PLANT

The AMPAC Fine Chemical (AFC) facility is an industrial pharmaceutical manufacturing plant located in Folsom, CA. The campus is grouped into two areas divided by a road, and a vacant area with a number of trees. The south site is supplied with steam from four boilers located in Building 5067. The north site is supplied with steam from four boilers located in Building 5026 and one boiler located in Building 5061. A general summary of the existing boilers is provided in Table 1-1.

Table 1-1: Summary of Existing Boilers

North Site Boilers

Bldg No.	Boiler No.	Make	Low Nox Retrofit	Primary Fuel	Secondary Fuel	Capacity (MMBtu)
5026	3	Cleaver Brooks	Completed	natural gas	propane	3.36
5026	4	Cleaver Brooks	Completed	natural gas	propane	3.36
5026	5	Cleaver Brooks	Completed	natural gas	propane	3.36
5026	6	Husky	2009	natural gas	propane	6.30
5061		Abco	N/A	natural gas	propane	1.26
			Total North Site Capacity			**17.64**

South Site Boilers

Bldg No.	Boiler No.	Make	Low Nox Retrofit	Primary Fuel	Secondary Fuel	Capacity (MMBtu)
5067	1	Cleaver Brooks	Completed	natural gas	diesel	12.60
5067	2	Cleaver Brooks	2009	natural gas	none	8.37
5067	3	Abco	Completed	natural gas	diesel	8.60
			Total South Site Capacity			**29.57**
			Total AFC Steam Capacity			**47.21**

AFC staff provided Burns & McDonnell with an aerial photo of the existing AFC campus which indicated where the existing boilers and steam lines were located. Burns & McDonnell reviewed the site and identified two potential sites where a new CHP plant could be located. In addition, if AFC decides to install one CHP plant at the south site, a new steam pipeline and new condensate return pipeline would be required to connect the two existing steam distribution systems. A map showing the location of the existing boilers, existing steam distribution systems, the potential CHP plant sites, and the potential pipeline routing to connect to the north and south sites is presented in Figure 1-1.

Figure 1-1: AFC Site Map

* * * * *

SECTION 2.0

SITE ENERGY REQUIREMENTS

2.0 SITE ENERGY REQUIREMENTS

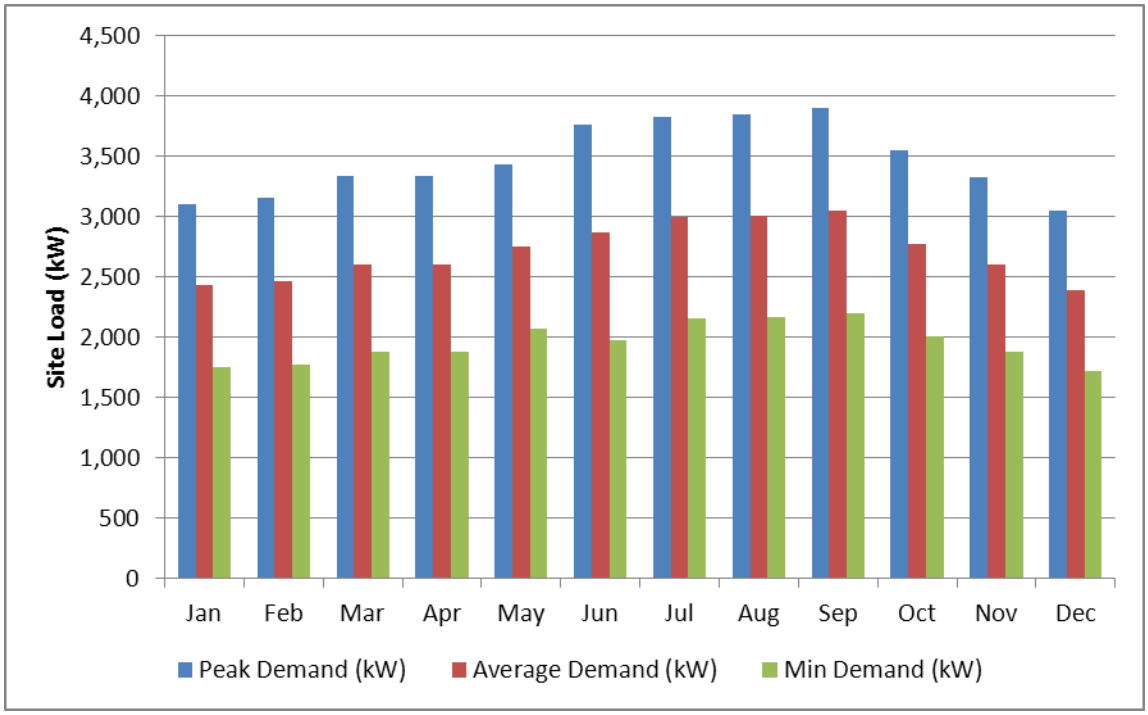
2.1 OVERVIEW

The existing AFC complex is divided into a north site and south site. The following section provides an overview of the thermal and electrical loads at each of the sites and the development of the load data which was used to size the proposed CHP configurations.

2.2 ELECTRIC LOADS

AFC currently purchases electricity for the north and south sites through Aerojet. Aerojet purchases electricity from SMUD and then resells it to AFC at the same retail rate. AFC provided Burns & McDonnell the historical electricity consumption data for the last four years. Burns & McDonnell then calculated the estimated maximum, average and minimum daily load data for each month so that an hourly electric load shape could be developed. The load shape was used to determine when the proposed CHP plant would off-set existing site electric load at the current retail electric rates and when the CHP plant would export energy back to SMUD at the feed-in-tariff (FIT) rates.

Figure 2-1: Monthly Electric Demands – Total Site



2.3 STEAM LOADS

Currently, the north and south steam distribution systems are not connected and they operate independently. Steam is supplied to the north site by the two existing boiler houses located on the north site which are each comprised of several existing gas fired boilers. These boilers are connected through the north site steam supply distribution system and condensate return system and are sized to meet the maximum thermal needs of the north site. Steam supplied to the south site is generated by a single boiler house located on the south site which is comprised of several individual gas fired boilers and is sized to meet the maximum thermal needs of the south site. The steam is distributed to the various buildings by an existing steam distribution system with no condensate return system. AFC provided historical monthly natural gas usage data for each of the boilers along with estimated minimum, average and peak steam loads at each site. The minimum steam load data at each site was used to size the CHP configurations developed in this study. A summary of the estimated minimum, average and maximum monthly steam demand data provided by AFC is provided below.

	North	South	Total
Minimum Steam Load (lbs/hr)	5,500	7,000	12,500
Average Steam Load (lbs/hr)	8,000	15,000	23,000
Maximum Steam Load (lbs/hr)	12,000	25,000	37,000

2.4 CHP HEAT RECOVERY UTILIZATION

In the development of the Burns & McDonnell February 2010 report, SMUD and AFC requested that Burns & McDonnell evaluate several CHP configurations. In this update, the addition of the waste to fuel capability was evaluated along the following CHP configurations:

1. A single new CHP plant located at the south site sized to serve the total AFC minimum thermal load of 12,500 lb/hr. This would require the addition of new steam and condensate lines to connect the north and south site systems.
2. A single new CHP plant located at the south site utilizing microturbines which would be sized to serve the south site's minimum thermal load of 7,000 lbs/hr. No site interconnection would be required.
3. A single new CHP plant located at the south site utilizing reciprocating engines which would be sized to serve the south site's minimum thermal load of 7,000 lbs/hr. No site interconnection would be required.

* * * * *

SECTION 3.0

WASTE FUELS ANALYSIS

3.0 WASTE FUELS ANALYSIS

3.1 BACKGROUND

Burns & McDonnell obtained the byproduct stream components and annual quantities from AFC. The chemicals were analyzed to determine heating value, combustibility and contaminants present. The byproducts that provided promising fuel characteristics were identified and the process requirements for converting them into acceptable fuels were developed. The byproduct fuel characteristics were provided to three vendors to solicit opinions on the compatibility of the byproduct fuels with their technology. Based on the resulting information, the available byproduct fuel quantities were established.

3.2 ANALYSIS

Based on information provided by AMPAC, 3,572,000 kg of solvent wastes are produced that have the potential be utilized as fuels. Of this waste stream, 3,424,000 kg (96 percent) are combustible hydrocarbon compounds containing carbon, hydrogen, oxygen and nitrogen atoms. The remaining 148,000 kg (4 percent) are various compounds that contain other atoms. The other compounds may be unsuitable for combustion either because they may inhibit the combustion reaction or produce potentially corrosive by-products. Examples of these contaminant compounds include Methylene Chloride, Chloromethyl-2propylcarbonate and compounds containing Bromine. Stream ACC 340.2 which primarily contains Methylene Chloride (68 percent) is not considered to be a suitable fuel and should be segregated from the potential waste fuel streams. Stream ACC-340.2 should not be blended with the other streams to be utilized as fuel. Sixteen percent of stream ACC-288 is made up of Bromine compounds. Stream ACC-288 should be partially segregated, physically at the source, to eliminate Ethyl Bromide and t-butylbromide from the fuel stream. The remainder of ACC-288 should be suitable as a fuel. The streams that are suitable as fuel and their annual quantities are shown in Table 3-1.

Some of the streams contain components that are less suitable for combustion but are a small percentage of the stream (typically less than 1 percent). On a first analysis basis, these smaller components do not pose sufficient risk to warrant a separation scheme. The streams identified with a check mark have trace components that will likely have products of combustion other than CO_2 and H_2O. ACC-308/324 contains 1 percent Sodium Methoxide. ACC-268 contains 1 percent Methanesulfonic Acid. However, in a blended fuel stream, the impact on combustion and combustion by-products is expected to be minimal. ACC-289 contains 3 percent Chloromethyl-2propylcarbonate and the effect of chlorine during combustion may be detrimental. The largest contaminant in a blend of all waste fuel streams would be Chloromethyl-2propylcarbonate, at 2 percent, coming from stream ACC-289. Stream ACC-289 was

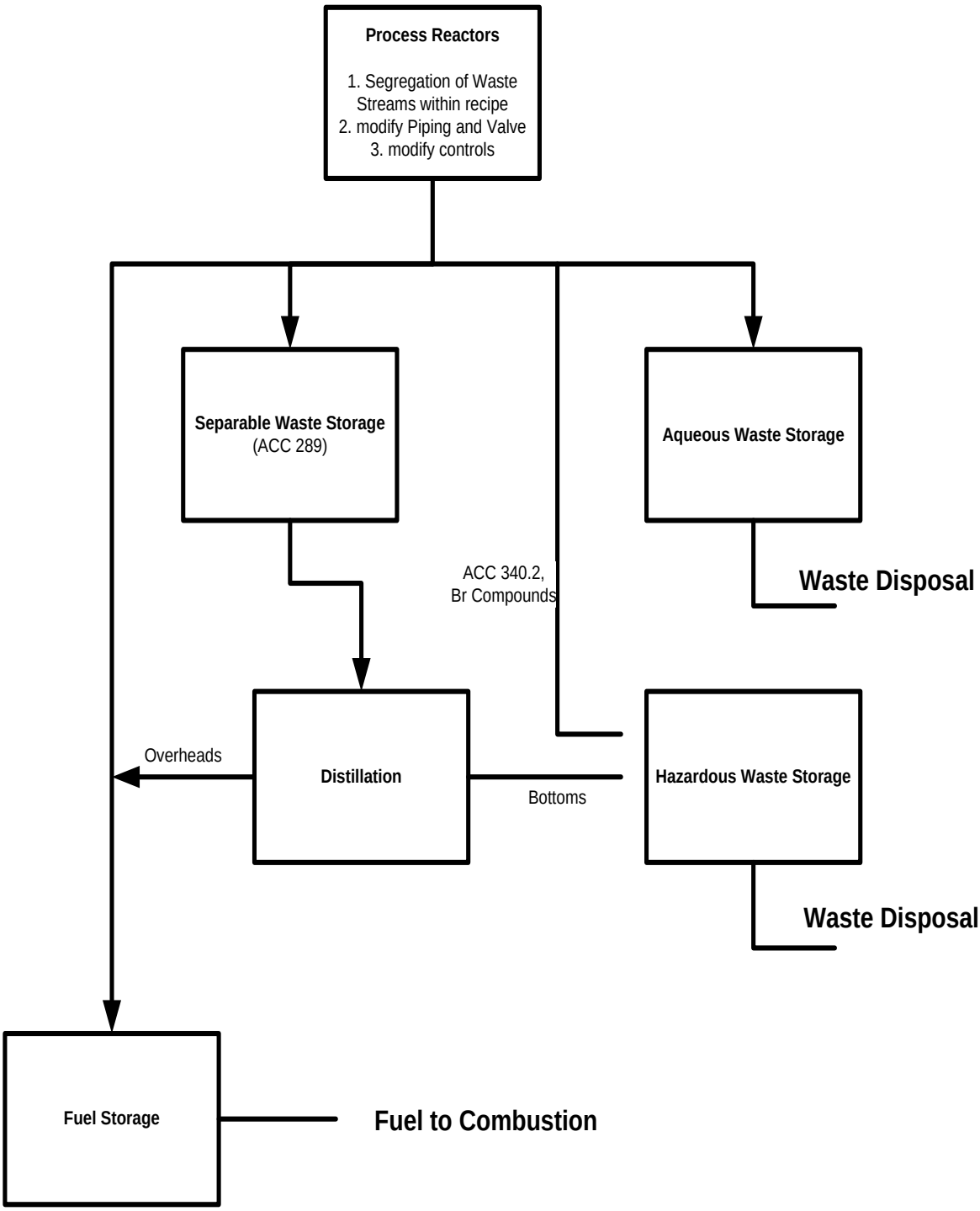
evaluated for a separation unit operation (distillation) to eliminate most of Chloromethyl-2propylcarbonate prior to blending with other waste streams and being used as a fuel.

Table 3-1 Annual Waste Fuel Quantities by Stream

Fuel Stream	Quantity (kg)	Streams With Trace Components
ACC-261/278, ACC-321/322	9,116	
ACC-308/324	121,627	✓
ACC-262/322	697,382	
ACC-289	1,948,036	✓
ACC-288 (after Bromine compound segregation)	197,686	✓
ACC-268	530,166	✓
ACC-342.3	18,315	
ACC-342.2	10,397	
ACC-342.1	8,004	
ACC-341/343	1,793	
ACC-340.1	18,351	
ACC-340	11,511	

A block flow diagram of the proposed approach to creating a blended fuel stream is shown on the following page in Figure 3-1. The elements of the strategy include modifying reactor exit piping, valves and controls to allow segregation within recipes as well as from individual reactors. Separable waste is intended to be sent to distillation where the concentration of the contaminating compound is decreased to a suitable level. Material that is not suitable as a fuel is sent to Hazardous Waste Storage. In the current analysis, aqueous waste was not evaluated. The objective of this approach is to provide a continuous fuel stream to a CHP combustion device.

Figure 3-1: Blended Fuel Stream Block Flow Diagram



3.3 BLENDED FUEL

The composition of the blended fuel was estimated by assuming that the projected number of batches per year for each product (stream) was evenly distributed throughout the year and that one to two months of waste fuel storage capacity would be available. The fuel being provided to the CHP device was assumed to have been blended from the constituent number of batches for each stream as shown in Table 3-2 below. The estimated blended fuel stream composition shown in Table 3-3 represents 98.35 percent of stream. The other 1.65 percent consists of several hydrocarbon components of a proprietary nature and various components making up less than 0.1 percent of the stream.

Table 3-2 Blended Fuel Constituent Streams

Description	Batches/Yr.	Batches/Mo.
ACC-261/278, ACC-321/322	212	17
ACC-308/324	48	4
ACC-262/322	127	10
ACC-289	113	9
ACC-288	57	4
ACC-268	59	4
ACC-342.3	6	0.5
ACC-342.2	6	0.5
ACC-342.1	6	0.5
ACC-341/343	9	0.7
ACC-340.1	3	0.2
ACC-340	3	0.2

3.3.1 Stream ACC-289

Stream ACC-289 represents over 50 percent of the annual quantity of solvent waste generated. However, the stream contains 3 percent Chloromethyl-2propylcarbonate. This chlorinated compound could be detrimental in a combustion process due to inhibition of combustion reactions and generation of potentially corrosive chlorine compounds. As a result, it is desirable to separate out the chlorinated compound but retain the hydrocarbon components in the fuel stream.

Table 3-3 Blended Fuel Stream Composition

Description	Formula	MW	kg/month	Mass - %
Acetone	C_3H_6O	58.08	85,098	31.37%
Acetonitrile	C_2H_3N	41.05	368	0.14%
Butanol	$C_4H_{10}O$	74.12	274	0.10%
Chloromethyl-2propylcarbonate	$C5H_9ClO_3$	152.58	520	0.19%
Dimethylformamide	C_3H_7NO	73.09	12,117	4.47%
Ethanol	C_2H_6O	46.07	8,222	3.03%
Ethyl Acetate	$C_4H_8O_2$	88.11	5,354	1.97%
Fumaric Acid	$C_4H_4O_4$	116.07	792	0.29%
Heptane	C_7H_{16}	100.21	707	0.26%
Isopropyl alcohol	C_3H_8O	60.1	20,596	7.59%
Isopropyl Acetate	$C_5H_{10}O_2$	102.13	22,803	8.41%
IsoPropyl Ether	$C_6H_{14}O$	102.18	59,840	22.06%
Methanesulfonic Acid	CH_4O_3S	96.11	351	0.13%
Methanol	CH_4O	32.04	9,722	3.58%
MTBE, Methyl tert-butyl ether	$C_5H_{12}O$	88.15	2,073	0.76%
NMP, N-Methyl-2-pyrrolidone	C_5H_9NO	99.13	18,627	6.87%
Propylene Carbonate	$C_4H_6O_3$	102.09	304	0.11%
TEA, triethylamine	$C_6H_{15}N$	101.19	2,319	0.85%
Toluene	$C_6H_5CH_3$	92.14	15,510	5.72%
Water			1,216	0.45%

Separation of the chlorinated compound from the stream using distillation was simulated in ASPEN PLUS. The composition and feed rate for an ASPEN PLUS simulation were based on the component rates listed in Table 3-4 and assuming 8,000 hours of continuous operation annually. The simulated feed stream is shown in Table 3-5. Compounds with relatively low concentrations were not modeled. ASPEN PLUS simulation using a continuous distillation tower with a condenser, a re-boiler and 30 feet of 1.5 inch packing was performed. The separation was obtained with a reflux ratio of 5 to 1, a condenser duty of 481,000 Btu/hr. and a re-boiler duty of 512,000 Btu/hr. The estimated tower inner diameter (ID) is 18 inches and the tower height is approximately 40 feet. It was concluded that it is feasible to transform the feed stream containing 3.4 wt percent Chloromethyl-2-Propylcarbonate by continuous distillation into a distillate stream which accounts for 84.3 percent of the feed stream containing only 0.3 percent Chloromethyl-2-Propylcarbonate and a bottoms stream that is 15.7 wt percent of the feed stream that contains 20 percent Chloromethyl-2-Propylcarbonate. It is proposed that the distillate stream can be used as fuel and the bottoms stream can be sent to hazardous waste disposal. Conceptually, the feed stream would be accumulated in storage tanks as it is produced and fed continuously to the distillation tower.

Table 3-4 ACC-289 Fuel Stream Composition

Description	Batch	Distribution	Annual	Comment
	(kg)		(kg)	
Acetone	2695	16%	304,535	Hydrocarbon, potential fuel
Water	33.82	0%	3,822	
NMP	2069.66	12%	233,872	
TEA	257.65	1%	29,114	
Chloromethyl-2propylcarbonate	577.8	3%	65,291	Must separate from stream
Hydroxylamine	0.27	0%	31	
N6-Hydroxymethyl	2.38	0%	269	
Oxime	3.5	0%	396	
Ammonium Acetate	1.3	0%	147	
Isopropyl Acetate	2533.71	15%	286,309	Hydrocarbon, potential fuel
Sodium Chloride	2.65	0%	299	
Fumaric Acid	88.04	1%	9,949	Hydrocarbon, potential fuel
IPA	2249.86	13%	254,234	Hydrocarbon, potential fuel
PMPA-TEA Salt	20.85	0%	2,356	
Tenofovir DF	53.84	0%	6,084	
IsoPropyl Ether	6648.93	39%	751,329	Hydrocarbon, potential fuel

3.3.2 Blended Fuel Heating Value

The heating value of the blended fuel stream was estimated to allow preliminary sizing of the CHP prime mover. The calculated heating value was determined on the basis component mass and component heating value. Initially, the heating value per gram was calculated for the component and then the total estimated mass per month was utilized to establish the available heating value per month. As an example, the heating value equation for Acetone is shown below and the heating value calculation is shown in Table 3-6.

- Acetone + Oxygen = Carbon Dioxide + Water
- $C_3H_6O + 4\ O_2 = 3\ CO_2 + 3\ H_2O$

Table 3-5 Separation of Stream ACC-289

Separation of Stream ACC-289	**Feed**	**Overhead**	**Bottoms**
Temperature (F)	70	142	392.1
Pressure (psia)	20	15	17
Vapor Fraction	0	0	0
Mole Flow (lbmol/hr)	6.336	5.55	0.785
Mass Flow (lb/hr)	534.11	450	84.11
Volume Flow (cu ft/hr)	10.387	9.78	1.481
Component Mass Flow (lb/hr)			
Acetone (C_3H_6O-01)	83.9	83.9	0
Water (H_20)	1	1	0
NMP, N-Methyl-2-pyrrolidone (C_5H_9N-01)	64.6	0	64.6
TEA, triethylamine ($C_6H_{15}N$-01)	8	8	0
Chloromethyl-2propylcarbonate ($C_5H_9CLO_3$)	18	1.19	16.81
Hydroxylamine (H_3NO)	0.01	0.01	0
Isopropyl Acetate (C_5H_{10}-01)	78.9	78.9	0
Fumaric Acid (C_4H_4O-01)	2.7	0	2.7
Isopropyl Alcohol (C_3H_8O-01)	70	70	0
Diisopropyl Ether (C_6H_{14}-01)	207	207	0
Weight %			
Acetone (C_3H_6O-01)	15.70%	18.60%	0.00%
Water (H_20)	0.20%	0.20%	0.00%
NMP, N-Methyl-2-pyrrolidone (C_5H_9N-01)	12.10%	0.00%	76.80%
TEA, triethylamine ($C_6H_{15}N$-01)	1.50%	1.80%	0.00%
Chloromethyl-2propylcarbonate ($C_5H_9CLO_3$)	3.40%	0.30%	20.00%
Hydroxylamine (H_3NO)	0.00%	0.00%	0.00%
Isopropyl Acetate (C_5H_{10}-01)	14.80%	17.50%	0.00%
Fumaric Acid (C_4H_4O-01)	0.50%	0.00%	3.20%
Isopropyl Alcohol (C_3H_8O-01)	13.10%	15.60%	0.00%
Diisopropyl Ether (C_6H_{14}-01)	38.80%	46.00%	0.00%

Table 3-6 Heating Value Calculation for Acetone

Compound	Heating Value (kJ/mol.)	Molecules	Heating Value (kJ/mol.)
Acetone	-217	1	-217
Oxygen	0	4	0
Carbon Dioxide	-393	3	-1,181
Water	-285	3	-857
Net Higher Heating Value per Molecule			1,821 kJ/mol.
Molecular Weight			58 g/mol.
Net Higher Heating Value per mass			31.35 kJ/g

Acetone and Isopropyl Ether are the two largest components with 31.37 mass percentage and 22.06 mass percentage, respectively, as shown previously in Table 3-3. Other significant components include Isopropyl Acetate, Isopropyl Alcohol, N-Methyl-2-pyrrolidone and Toluene. Some of the smaller components were not included in the estimation due to their low mass percentage. In general, the gross heating value is of the same order of magnitude as that of fuel oil and maybe slightly lower. The total quantity of heat available for CHP is approximately 17 MMBTU/Hr as shown in Table 3-7.

3.3.3 Blended Fuel Characteristics

It is common practice to produce fuel oils that comply with certain specifications as defined by ASTM standards. Typically, fuel oils are graded according to density (specific gravity) and viscosity. The lightest fuel oil is designated as No. 1 and the heaviest being No. 6. Since equipment for handling and burning of fuel oil is usually designated for a maximum viscosity, it is necessary to know the characteristics of the fuel to be used. In addition to density and viscosity, the mass percentage of components that participate in the combustion reaction can also be compared between different fuels. A calculated gross heating value also provides a basis of comparison for different fuels. Table 3-8 provides a comparison of the blended fuel stream produced from the waste streams in the process to fuel oils No. 1 and No. 2.

Table 3-7 Development of Heating Value

Blended Fuel Stream	**Heating Value**			
	kJ/g	MMBtu/month	MMBtu/day	MMBtu/hour
Acetone	31	2,527	84	4
Butanol	37	9	0	0
Chloromethyl-2propylcarbonate	80	40	1	0
Dimethylformamide	106	1,219	41	2
Ethanol	31	238	8	0
Ethyl Acetate	26	131	4	0
Fumaric Acid	11	9	0	0
Heptane	48	32	1	0
Isopropyl alcohol	68	1,332	44	2
Isopropyl Acetate	56	1,217	41	2
IsoPropyl Ether	40	2,242	75	3
Methanol	48	439	15	1
NMP, N-Methyl-2-pyrrolidone	121	2,130	71	3
Propylene Carbonate	0	0	0	0
TEA, triethylamine	174	383	13	1
Toluene	43	629	21	1
Total		**12,578**	**419**	**17**

Other ASTM standard fuel characteristics such as flash point, pour point, ash content, water and sediment volume percent, distillation temperatures and copper strip corrosion can be obtained by standard laboratory measurements and can be a further basis for comparison.

Table 3-8 Blended Fuel Characteristics

Description	Mass Percent		
		Fuel Oil	
	Fuel Blend	No. 1	No.2
Carbon	63.00%	86.00%	86.90%
Hydrogen	11.00%	13.40%	12.50%
Oxygen	24.00%	-	-
Nitrogen	2.00%	0.10%	0.10%
Sulfur	0.04%	0.50%	0.50%
Chlorine	0.05%	-	-
Other Characteristics			
Density (lb/ft3)	51.32	50.79	53.34
Viscosity (cP)	0.53	1.47	2.14
Heating Value (Btu/lb)	21,481	19,750	19,500

3.4 PRELIMINARY CAPITAL COST ESTIMATION

Based on the feasibility analysis conducted, a gross cost estimate for the project with order of magnitude accuracy is presented in Table 3-8. It should be noted that the full scope of the project has not been defined and the actual cost will be clearer after a more detailed definition of the project is developed. The costs projected are only for taking the waste streams from the batch reactors and converting them to a suitable continuous stream for the CHP device. The costs in Table 3-8 do not include the costs associated with the CHP equipment, which are summarized in Section 5 of this report. In addition, the costs do not include costs for aqueous waste or hazardous waste storage and disposal. The capital cost of implementing the described approach to converting waste streams into fuel streams will consist of expenditures estimated in Table 3-8.

It is assumed that some storage tanks exist and can be re-purposed as required. It is also anticipated that some new storage tanks will have to be purchased. The size and the design of the tanks will have to be established in next phase of analysis. A distillation column with standard packing was assumed. The re-boiler and the condenser associated with the distillation column are included in the Heat Exchangers cost. Reflux drums associated with the distillation column are included in the Tanks and Vessels cost. The availability of required process utilities such as steam and cooling water is assumed to exist on site at the required capacity and quality (pressure, temperature, etc.). The process piping cost includes piping, valves and pumps. Process automation costs include the instrumentation and controls associated with the distillation column and some updates to existing systems. The order of magnitude total capital cost is

anticipated to be approximately $1.85 million. Other costs such as demolition, site development, start-up, engineering and construction are not included in this value. The value is based on the preliminary feasibility analysis conducted and may change drastically based on the final scope of the project.

Table 3-8 Waste to Fuel System Capital Cost Estimates

Description	**Amount**
Tanks and Vessels	$ 150,000
Distillation Column	300,000
Heat Exchangers	250,000
Process Utilities	100,000
Process Piping	300,000
Process Automation (instrumentation/controls)	500,000
Civil, Structural, Architecture	150,000
Electrical	100,000
Total	**$ 1,850,000**

In addition to the equipment presented in Table 3-8, a vaporizer is also required. Depending on the specifications, the cost of the vaporizer is estimated to be $800,000 to $1,100,000. This cost includes the skid and accessories. The variance is driven primarily by the level of complexity in the number of valves, heat tracing, controls and instrumentation required.

A summation of the capital costs associated with the waste-to-fuel process is shown in Table 3-9. Capital costs include the waste to fuel system detailed in Table 3-8, as well as vaporizer equipment which would vary depending on the complexity of the CHP configuration. Along with the capital costs described in this section, an allowance for engineering and project management costs, general contractor costs, escalation costs, and contingency are identified. Total costs are estimated to be $3.6 million to $4.0 million depending on the vaporizer.

Table 3-9 Capital Cost Estimates Including Vaporizer Equipment

Description	Less Complex Configuration	More Complex Configuration
Waste to Fuel System	$ 1,850,000	$ 1,850,000
Vaporizer	800,000	1,100,000
Subtotal Direct Costs	$ 2,650,000	$ 2,950,000
Engineering and Project Management (8%)	$ 212,000	$ 236,000
General Contractor (8%)	212,000	236,000
Escalation (2012 - 2014) (2%/yr)	53,000	59,000
Subtotal Indirect Costs	$ 477,000	$ 531,000
Subtotal Direct & Indirect Costs	$ 3,127,000	$ 3,481,000
Contingency (15%)	469,000	522,000
Total	**$ 3,596,000**	**$ 4,003,000**

3.5 MANUFACTURER FUEL COMPATIBILITY OPINIONS

Information on the chemical composition and quantities of the byproduct fuel components was provided to Cleaver-Brooks, Solar Turbines, and LPP Combustion, along with a request to provide an opinion on the following issues related to burning the byproduct fuel in their combustion device:

- The compatibility of the byproduct fuel with their combustion device
- An opinion on the likely emissions characteristic
- A brief scope of work and estimated cost to perform testing to establish compatibility and define the emissions characteristics
- The quantity of fuel required for such a test

3.5.1 Cleaver-Brooks

Cleaver Brooks indicated the liquid waste stream would burn well and was compatible with their combustion device. Air atomizing or mechanical atomizing is recommended depending on the estimated total flow of fuel and turndown requirements.

The likely emissions characteristics were estimated to be as follows:

- FBN 0.02 percent
- NOx <250 ppm

A brief scope of work and estimated cost to perform testing to verify fuel compatibility and establish emissions characteristics included the following steps, which include the typical scope of services that Cleaver-Brooks follows for the firing test of a liquid waste stream.

1. Customer will ship a small quantity of sample fuel (typically 1 gallon) to Cleaver-Brooks for analysis.
2. If Cleaver-Brooks determines that the byproduct fuel has a potential for being a suitable fuel, customer will ship a complete test sample to Cleaver-Brooks R&D facility in Milwaukee. The test quantity will be determined by the analysis (typically 100 gallons-minimum).
3. Cleaver-Brooks will set up a temporary fuel delivery system to one of the appropriate boilers at the R&D facility.
4. The sample will be fired in the Cleaver-Brooks boiler at a range of firing rates with samples taken for each one.
5. A formal test report will be prepared and delivered to the customer.
6. The price will be negotiated when the test scope and customer requirements have been defined.

3.5.2 Solar Turbines

Solar Turbines identified the following issues for combustion.

- Potential two phase fuel flow because of the volatility of the fuels.
- Heating value of the fuel is 30 percent lower than diesel fuel causing the turbine to be derated.
- High oxygen content of the fuel will require adjustment of the air fuel ratio.
- Sulfur and chlorine in the fuel is potentially corrosive to the engine and fuel train.
- High level of fuel bound nitrogen will result in High level of NOx.
- Turbine starting, acceleration and stopping will require standard fuel.
- Special requirements for the fuel pump and system.
- Significant testing will be required to determine compatibility.

3.5.3 LPP Combustion

LPP Combustion indicated the by-product waste streams as identified and qualified by Burns & McDonnell appear to be very compatible for vaporization by the LPP Combustion process into LPP Gas™ that can be safely utilized in the following combustion devices:

- A gas turbine dry low NOx combustor.

- A gas turbine with a diffusion burner.
- Any other type of industrial or boiler burner designed for natural gas operation.

LPP Combustion agreed that the ethyl bromide and t-butylbromide should be removed from Stream ACC-288 prior to vaporization of the balance. Additionally, LPP Combustion also agreed that Stream ACC340.2 which is primarily methylene chloride is not a good candidate for vaporizing into a clean, natural gas-equivalent fuel.

LPP Combustion can test Stream ACC-289 with and without the chloromethyl-2propylcarbonate to determine the effects of chloride in the Capstone C30 gas turbine in its test facility. The Capstone fuel gas specification 410002 Rev. F (January 2009) states the Capstone units are capable of using gaseous fuels with up to 1500 ppm chlorides.

LPP Combustion noted the baseline emissions for the Capstone C30 are typically as follows:

- Approximately 5 ppm NOx.
- CO emissions varying somewhat by fuel in the range of 25 ppm.

LPP Combustion would expect approximately the same emissions in vaporizing the waste streams into an LPP Gas™ They also noted the following:

- Potential quantitative conversion of fuel-bound nitrogen from the following components: acetonitrile, dimethylformamide, N-methyl-2-pyrrolidone, and triethylamine. These fuels will increase the baseline NOx emissions above the 5 ppm seen with fuels with no nitrogen.
- Some SOx formation may come from the methanesulfonic acid.

For testing purposes, LPP Combustion would like to obtain 20 gallons of the proposed fuel to vaporize and run through the C30. They would measure NOx and CO emissions with their in-house monitoring equipment. Testing would take about two weeks at an estimated price of $11,500. If a complete profile of all exhaust gas constituents is required, a grab sample could be taken and sent out for analysis for extra cost.

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SECTION 4.0

CHP SYSTEM ALTERNATIVES

4.0 CHP SYSTEM ALTERNATIVES

4.1 OVERVIEW

The selected CHP technologies considered in this study included the following alternatives.

- Option 1: A single CHP plant equipped with a 4.6 MW gross Solar Turbines Mercury 50 Combustion Turbine
- Option 2: A single CHP plant equipped with nine 200 kW gross Capstone C200 Microturbines
- Option 3: A single CHP plant equipped with two 1,137 kW gross GE Jenbacher JMS 416 Reciprocating Engines

Each option has been paired with waste to fuel capability as described in Section 3 of this report. Each option includes the appropriate vaporizer equipment, as is detailed further in this section of the report. In each of the configurations considered, the waste heat recovered from the prime mover's exhaust would be used to meet a portion of the site's thermal load. The waste to fuel capability provides opportunities to convert chemical waste to offset purchased natural gas in the operation of the CHP facility. Descriptions for each of the CHP configurations are presented in the remainder of this section.

4.2 OPTION 1 – SINGLE CHP PLANT WITH COMBUSTION TURBINE

Option 1 employed a Solar Turbines Mercury 50 Combustion Turbine with an estimated net generation output of 4,379 kW and a HRSG with an unfired steam output of 14,376 lb/hr. Since all of the steam generation capacity would be located at the South CHP Plant, 3000 feet of steam and condensate return piping would be required in order to interconnect the north and south steam distribution systems. Connecting the two sites would allow the 14,376 lb/hr of steam generation capacity to meet the combined north and south site minimum thermal load of 12,500 lb/hr. The steam would preheat 7,000 lb/hr of 70 °F makeup water to 200 °F at the south site before entering the HRSG. Duct firing in the HRSG will provide the balance of the steam requirement for peak load which would allow the existing boilers to remain in service only for redundancy. Natural gas requirements for the CHP facility will be reduced by 17 MMBtu/hr resulting from the waste fuel produced. The new CHP equipment would be in manufacturer supplied weatherproof enclosures and located adjacent to the existing South boiler house plant on a concrete pad. Electrical interconnection would be installed at the main substation. A general process flow diagram of Option 1 is presented in Appendix A.

4.3 OPTION 2 – SINGLE CHP PLANT WITH MICROTURBINES

Option 2 would employ nine Capstone C200 Microturbines with a total net generation output of 1,764 kW, and a HRSG with a total unfired steam output of approximately 6,300 lb/hr. Since the total unfired HRSG's output would be near the minimum thermal load of the south site, it would not be necessary to interconnect the two sites so that the new CHP plant could serve the thermal loads of both sites. It is anticipated that the waste fuel equipment would be able to meet the majority of the south site's CHP fuel requirements. A general process flow diagram of Option 2 is presented in Appendix A.

4.4 OPTION 3 – SINGLE CHP PLANT WITH RECIPROCATING ENGINES

Option 3 includes a single CHP plant adjacent to the south site boiler house, including two GE Jenbacher JMS 416 reciprocating engines, each with a net generation output of 1,114 kW, and HRSGs with an effective unfired steam output of 2,231 lb/hr. The CHP plant would have a total net generation output of 2,229 kW and total unfired steam output of 4,462 lb/hr. It is anticipated that the waste fuel provided would meet the majority of the south site's CHP fuel requirements. Under this configuration, no interconnecting piping would be included between the two sites. A general process flow diagram of Option 3 is presented in Appendix A.

4.5 CHP PLANT CONFIGURATION SUMMARY

The CHP plants configurations' assumptions regarding prime mover technology type, electrical generation output, fuel consumption, efficiency, steam generation output and number of units is presented in Table 4-1. These assumptions were used as the basis for determining the approximate capital cost of each option and provided the basis for the economic analysis of each configuration.

Table 4-1: CHP Plant Configurations - Performance Assumptions

Configuration	Option 1			Option 2			Option 3		
Project Description	Single CHP Plant Located at South Site - Supplying Steam to North and South Sites			Single CHP Plant Located at South Site - No Steam Interconnection			Single CHP Plant Located at South Site - No Steam Interconnection		
Site	North Site	South Site	Total	North Site	South Site	Total	North Site	South Site	Total
Estimated Average Electrical Load (kW)	1,500	1,500	3,000		1,500	1,500		1,500	1,500
Maximum CHP Electric Generation (kW)	5,000	5,000	5,000		5,000	5,000		5,000	5,000
Minimum Steam Load (lb/hr)	5,500	7,000	12,500		7,000	7,000		7,000	7,000
Average Steam Load (lb/hr)	8,000	15,000	23,000		15,000	15,000		15,000	15,000
Max Steam Load (lb/hr)	12,000	25,000	37,000		25,000	25,000		25,000	25,000
Power Generation Technology		Combustion Turbine	Combustion Turbine		Microturbine	Microturbine		Reciprocating Engine	Reciprocating Engine
Manufacturer		Solar Turbines	Solar Turbines		Capstone	Capstone		GE	GE
Prime Mover		Mercury 50	Mercury 50		C200 x 9	C200 x 9		Jenbacher JMS 416	Jenbacher JMS 416
Number of Units		1	1		1	1		2	2
Gross Power Generation per Unit (kW)		4,419	4,419		1,800	1,800		1,137	1,137
Aux Load per Unit (kW)		-40	-40		-36	-36		-23	-23
Net Power Generation per Unit (kW)		4,379	4,379		1,764	1,764		1,114	1,114
Fuel Input per Unit LHV (MMBtu/hr)		40.10	40.10		17.00	17.00		9.78	9.78
Fuel Input per Unit HHV (MMBtu/hr)		44.11	44.11		18.70	18.70		10.75	10.75
Prime Mover Heat Rate HHV (Btu/kWh)		10,073	10,073		10,601	10,601		9,651	9,651
Total Net Power Generation (kW)		4,379	4,379		1,764	1,764		2,229	2,229
Total Prime Mover Fuel Input HHV (MMBtu/hr)		44.1	44.1		18.7	18.7		21.5	21.5
Federal Investment Tax Credit (%)		10%	10%		10%	10%		10%	10%
Steam Generation Technology		HRSG	HRSG		HRSG	HRSG		HRSG	HRSG
Number of Units		1	1		1	1		2	2
Steam Generation per Unit (lb/hr)		14,376	14,376		6,300	6,300		2,231	2,231
Total Steam Generation (lb/hr)		14,376	14,376		6,300	6,300		4,462	4,462
Total Project Capital Cost ($)		$ 16,488,500	$ 16,488,500		$ 11,972,800	$ 11,972,800		$ 10,032,100	$ 10,032,100
SGIP Incentive ($)		$ (875,000)	$ (875,000)		$ (691,000)	$ (691,000)		$ (529,100)	$ (529,100)
Investment Tax Credit ($)		$ (1,648,900)	$ (1,648,900)		$ (1,197,300)	$ (1,197,300)		$ (1,003,200)	$ (1,003,200)
Net Project Capital Cost ($)		$ 13,964,600	$ 13,964,600		$ 10,084,500	$ 10,084,500		$ 8,499,800	$ 8,499,800
Prime Mover Maintenance Cost ($/unit)		$ 430,900	$ 430,900		$ 301,500	$ 301,500		$ 137,100	$ 137,100
Number of Units		1	1		1	1		2	2
Total Prime Mover Maintenance Cost ($)		$ 430,900	$ 430,900		$ 301,500	$ 301,500		$ 274,200	$ 274,200
Additional Managers		0	0		0	0		0	0
Additional Operators		0	0		0	0		0	0
Additional Maintenance Techs.		1	1		1	1		1	1

* * * * *

SECTION 5.0

CAPITAL COSTS

5.0 CAPITAL COSTS

5.1 OVERVIEW

Burns & McDonnell developed screening level capital cost estimations for each CHP configuration by obtaining quotes from vendors for the major equipment and using our construction cost database for the balance of plant costs.

5.2 OPTION 1 – SINGLE CHP PLANT WITH COMBUSTION TURBINE

Option 1 employs a Solar Turbines Mercury 50 Combustion Turbine, a HRSG and associated equipment. Since all of the steam capacity would be located at the south plant, steam and condensate return piping to the north site is required along with a new deaerator, reverse osmosis system, and condensate tank. Table 5-1 summarizes the major cost estimate line items required for Option 1, as well as the cost for the Waste to Fuel System and Fuel Vaporizer described in Section 3 of this report.

Table 5-1: Single CHP Plant with Combustion Turbine - Capital Cost Estimate

Item Description	Qty	Units	Unit Matl	Unit Lbr	Total Matl	Total Lbr	Total
Equipment Summary							
Mercury 50	1	pc	$ 3,623,400	$ 362,340	$ 3,623,400	$ 362,300	$ 3,985,700
Mercury 50 startup	1	pc	-	160,000	-	160,000	160,000
Gas compressor	1	pc	350,000	160,000	350,000	160,000	510,000
Turbine freight	1	pc	-	140,000	-	140,000	140,000
HRSG ERI w/diverter valve	1	pc	900,000	90,000	900,000	90,000	990,000
Stack	1	pc	90,000	9,000	90,000	9,000	99,000
Condensate tank with pumps	1	pc	35,000	3,500	35,000	3,500	38,500
Deaerator with boiler feed pumps	1	pc	90,000	9,000	90,000	9,000	99,000
RO system	1	pc	160,000	30,000	160,000	30,000	190,000
Waste to Fuel System	1	pc	1,850,000	-	1,850,000	-	1,850,000
LPP Fuel Vaporizer	1	pc	800,000	80,000	800,000	80,000	880,000
Total Equipment					$ 7,898,400	$ 1,043,800	$ 8,942,200
Mechanical Summary							
Steam piping 8"	1500	lf	$ 250	$ -	$ 375,000	$ -	$ 375,000
Condensate piping 4"	1500	lf	200	-	300,000	-	300,000
Insulation	3000	lf	4	-	12,000	-	12,000
Boiler feed water 2"	100	lf	100	-	10,000	-	10,000
City water	100	lf	40	-	4,000	-	4,000
Natural gas piping 4"	300	lf	40	-	12,000	-	12,000
Boiler blowdown system	1	lt	20,000	-	20,000	-	20,000
Plumbing system	1	lt	40,000	-	40,000	-	40,000
Total Mechanical					$ 773,000	$ -	$ 773,000
Civil Summary							
Site Grading	1	ea	$ 10,000	$ -	$ 10,000	$ -	$ 10,000
Concrete Pavement	1	ea	155,000	-	155,000	-	155,000
Total Civil					$ 165,000	$ -	$ 165,000
Electrical Summary							
Electrical Equipment and Controls	1	ea	$ 2,000,000	$ -	$ 2,000,000	$ -	$ 2,000,000
Total Electrical					$ 2,000,000	$ -	$ 2,000,000
Total Direct Costs					$ 10,836,400	$ 1,043,800	$ 11,880,200
Engineering and Project Management						**8.00%**	$ 950,400
General Contractor Fee & Profit						**8.00%**	950,400
Escalation (2012 - 2014)						**2.00%**	556,800
Total Indirect Costs							$ 2,457,600
Total Direct & Indirect Costs							$ 14,337,800
Contingency						**15.00%**	$ 2,150,700
Total Project Costs							$ 16,488,500

5.3 OPTION 2 – SINGLE CHP PLANT WITH MICROTURBINES

Option 2 employs nine Capstone C200 Microturbines, two HRSGs, and an associated balance of plant equipment. Since the new CHP plant would only tie in to the existing south site steam distribution system, minimal additional mechanical and electrical equipment would be required. In addition, since the total un-fired steam output of the HRSGs is less than the minimum south site thermal load, no interconnection piping costs between the north and south sites are included in the capital cost estimate. Table 5-2 summarizes the major cost estimate line items required for Option 2.

Table 5-2: Single CHP Plant with Microturbines - Capital Cost Estimate

Item Description	Qty	Units	Unit Matl	Unit Lbr	Total Matl	Total Lbr	Total
Equipment Summary							
Capstone Mictroturbines Modules (1,800 kW)	1	pc	$ 3,240,000	$ 324,000	$ 3,240,000	$ 324,000	$ 3,564,000
Startup	1	pc	-	160,000	-	160,000	160,000
Waste to Fuel System	1	pc	1,850,000	-	1,850,000	-	1,850,000
LPP Fuel Vaporizer	1	pc	1,100,000	110,000	1,100,000	110,000	1,210,000
Total Equipment					$ 6,190,000	$ 594,000	$ 6,784,000
Mechanical Summary							
Steam piping 8"	200	lf	$ 250	$ -	$ 50,000	$ -	$ 50,000
Condensate piping 4"	200	lf	200	-	40,000	-	40,000
Insulation	400	lf	4	-	1,600	-	1,600
Boiler feed water 2"	100	lf	100	-	10,000	-	10,000
City water	100	lf	40	-	4,000	-	4,000
Natural gas piping 4"	300	lf	40	-	12,000	-	12,000
Boiler blowdown system	1	lt	20,000	-	20,000	-	20,000
Plumbing system	1	lt	40,000	-	40,000	-	40,000
Total Mechanical					$ 177,600	$ -	$ 177,600
Civil Summary							
Site Grading	1	ea	$ 10,000	$ -	$ 10,000	$ -	$ 10,000
Concrete Pavement	1	ea	155,000	-	155,000	-	155,000
Total Civil					$ 165,000	$ -	$ 165,000
Electrical Summary							
Electrical Equipment and Controls	1	ea	$ 1,500,000	$ -	$ 1,500,000	$ -	$ 1,500,000
Total Electrical					$ 1,500,000	$ -	$ 1,500,000
Total Direct Costs					$ 8,032,600	$ 594,000	$ 8,626,600
Engineering and Project Management						**8.00%**	$ 690,100
General Contractor Fee & Profit						**8.00%**	$ 690,100
Escalation (2012 - 2014)						**2.00%**	$ 404,300
Total Indirect Costs							$ 1,784,500
Total Direct & Indirect Costs							$ 10,411,100
Contingency						**15.00%**	$ 1,561,700
Total Project Costs							$ 11,972,800

5.4 OPTION 3 – SINGLE CHP PLANT WITH RECIPROCATING ENGINES

Option 3 includes a single CHP plant adjacent to the south site boiler house, including two GE Jenbacher JMS 416 reciprocating engines and two HRSGs. This option did not include interconnection between the north and south steam distribution systems since the un-fired steam capacity of the HRSGs is less than the minimum site thermal load of the south site. Table 5-3 summarizes the major cost items required for Option 3.

Table 5-3: CHP Plant with Reciprocating Engines - Capital Cost Estimate

Item Description	Qty	Units	Unit Matl	Unit Lbr	Total Matl	Total Lbr	Total
Equipment Summary							
Engine generator with all engine accessories, including radiators, HRSG, mufflers and SCR South Engine, with heat exchanger	2	pc	$ 1,196,900	$ 179,500	$ 2,393,800	$ 359,000	$ 2,752,800
Waste to Fuel System	1	pc	1,850,000	-	1,850,000	-	1,850,000
LPP Fuel Vaporizer	1	pc	800,000	80,000	800,000	80,000	880,000
Total Equipment					$ 5,113,800	$ 446,000	$ 5,559,800
Mechanical Summary							
Boiler feed water 2"	100	lf	$ 100	$ -	$ 10,000	$ -	$ 10,000
City water	100	lf	40	-	4,000	-	4,000
Natural gas piping 4"	300	lf	40	-	12,000	-	12,000
Boiler blowdown system	1	lt	20,000	-	20,000	-	20,000
Plumbing system	1	lt	40,000	-	40,000	-	40,000
Total Mechanical					$ 86,000	$ -	$ 86,000
Civil Summary							
Site Grading	1	ea	$ 5,000	$ -	$ 5,000	$ -	$ 5,000
Concrete Pavement	1	ea	77,500	-	77,500	-	77,500
Total Civil					$ 82,500	$ -	$ 82,500
Electrical Summary							
Electrical Equipment and Controls	1	ea	$ 1,500,000	$ -	$ 1,500,000	$ -	$ 1,500,000
Total Electrical					$ 1,500,000	$ -	$ 1,500,000
Total Direct Costs					$ 6,782,300	$ 446,000	$ 7,228,300
Engineering and Project Management						**8.00%**	$ 578,300
General Contractor Fee & Profit						**8.00%**	578,300
Escalation (2012 - 2014)						**2.00%**	338,700
Total Indirect Costs							$ 1,495,300
Total Direct & Indirect Costs							$ 8,723,600
Contingency						**15.00%**	$ 1,308,500
Total Project Costs							$ 10,032,100

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SECTION 6.0

OPERATION AND MAINTENANCE COSTS

6.0 OPERATION AND MAINTENANCE COSTS

6.1 OVERVIEW

Burns & McDonnell developed estimated operation and maintenance costs for each of the proposed CHP configurations. Since these CHP systems would only add equipment to existing systems, the incremental operations and maintenance costs for each system is only that which is related to the new equipment items. It is assumed that one additional industrial plant mechanic would be required to support the additional equipment for each option. Long Term Service Agreements (LTSA) will be in place for the major pieces of equipment such as turbine generators and reciprocating engines.

6.2 OPTION 1 – SINGLE CHP PLANT WITH COMBUSTION TURBINE

Burns & McDonnell assumed that AFC would enter into a LTSA with Solar Turbines for the regular maintenance inspections, non-scheduled site visits, repairs, remote monitoring and diagnostics, and overhauls. The estimated annual fee for the Solar Turbine Mercury 50 Combustion Turbine LTSA, provided by Solar Turbine, is $430,900 per year. In addition to the LTSA, Burns & McDonnell assumed that one additional maintenance technician would be required to support the new combustion turbine, HRSG, waste fuel system, and LPP vaporizer. A wage rate of $50 per hour or $100,000 per year was assumed.

6.3 OPTION 2 – SINGLE CHP PLANT WITH MICROTURBINES

Burns & McDonnell assumed that AFC would enter into a LTSA with Capstone for the regular maintenance inspections, non-scheduled site visits, repairs, remote monitoring and diagnostics, and overhauls. The annual fee for the LTSA is estimated to be $301,500 based on information provided by Capstone. In addition to the LTSA, Burns & McDonnell assumed that one additional maintenance technician would be required to support the new microturbines, HRSGs, waste to fuel system, and LPP vaporizer. A wage rate of $50 per hour or $100,000 per year was assumed.

6.4 OPTION 3 – SINGLE CHP PLANT WITH RECIPROCATING ENGINES

Burns & McDonnell assumed that AFC would enter into a LTSA with GE Jenbacher for the maintenance of the two new engines. Maintenance for reciprocating engines will typically include maintenance labor, engine parts and materials, minor and major overhauls, and remote monitoring of engine performance for predictive maintenance purposes. The estimated total operation and maintenance costs for engines such as JMS 416 is approximately $13 per MWh ($2007). Assuming 8,000 hours per year of run time, and

two new engines, the total O&M would be approximately $274,200 per year. In addition to the LTSA, Burns & McDonnell assumed that one additional maintenance technician would be required to support the new reciprocating engines, HRSGs, waste to fuel equipment, and LPP vaporizer. A wage rate of $50 per hour or $100,000 per year was assumed.

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SECTION 7.0

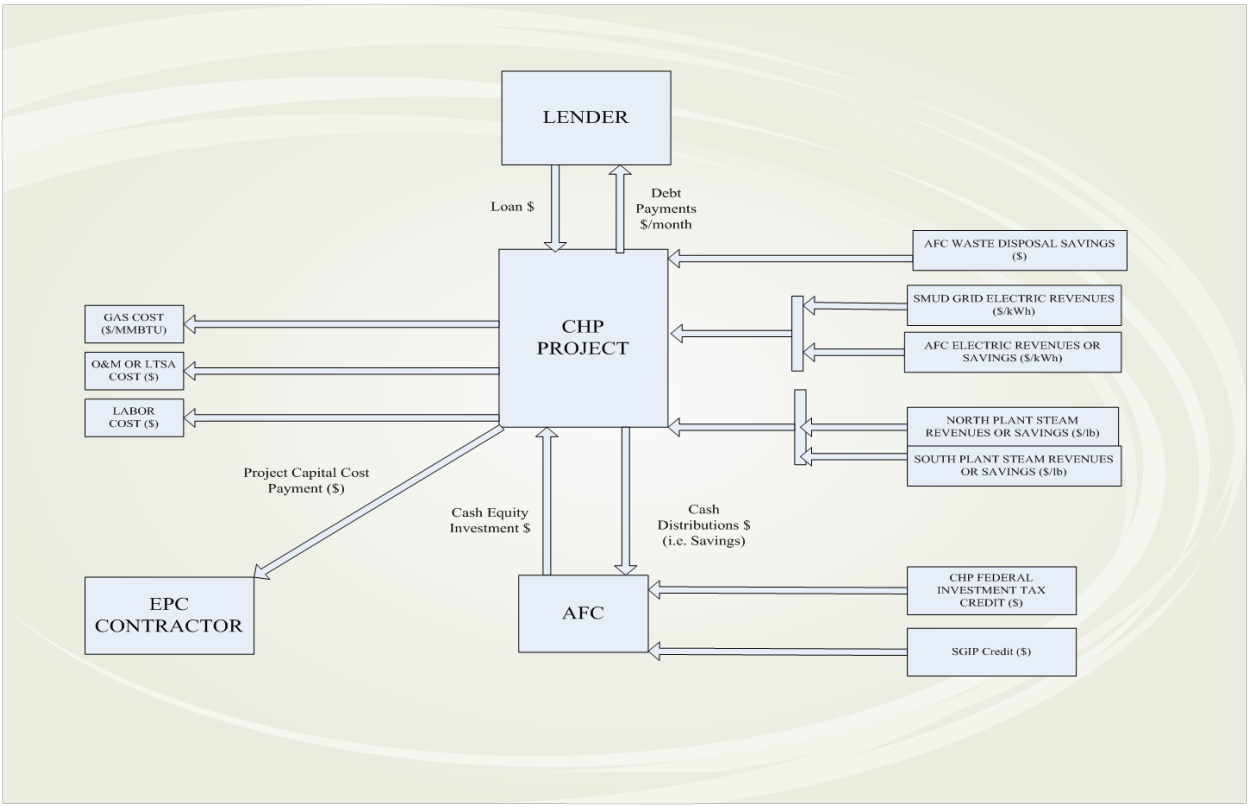
ECONOMIC ANALYSIS

7.0 ECONOMIC ANALYSIS

7.1 OVERVIEW

Burns & McDonnell prepared an economic analysis of each of the proposed CHP configurations to determine which one provided the highest net present value (NPV) benefit under an AFC ownership structure. The analysis assumed that AFC would own and operate the CHP plant and would generate revenues from steam sales and electric sales to offset the capital cost and operating cost of the project. The steam sales would be in the form of a reduction in the amount of steam generated by natural gas fired boilers or a natural gas offset. Savings would also be provided by no longer paying for the disposal of a significant portion of waste byproduct. The electric sales would be in the form of a reduction in electric purchased from Aerojet as well as electric sales to SMUD's grid when the CHP plant generated more electricity than AFC required. Based on input from AFC, Burns & McDonnell assumed the project would be funded with 100 percent debt financing and a federal investment tax credit. Figure 7-1 represents the proposed business model of the proposed CHP plant project under AFC ownership.

Figure 7-1: CHP Plant Project Business Model



7.2 ASSUMPTIONS

Burns & McDonnell worked with AFC and SMUD to develop the assumptions for the proposed CHP plant project which included economic assumptions, commodity price assumptions, and operating assumptions. The specific performance assumptions, capital cost assumptions, and O&M cost assumptions for each CHP configuration are discussed in previous sections of this report. The general economic assumptions, commodity price assumptions, and operating assumptions are listed below:

General Economic Assumptions

- O&M Escalation Rate — 2.00%
- Labor Escalation Rate — 3.00%
- Corporate Discount Rate — 15.00%
- Corporate Tax Rate — 40.00%
- Debt Ratio — 100%
- Debt Interest Rate — 10.00%
- Debt Term — 20 years
- Depreciation Rate — 5 years MACRS
- Maintenance Labor Rate — $50 per hour
- CHP Investment Tax Credit — 10.00% of capital cost
- CPUC SGIP Incentive – — $500/kW [1]

Commodity Price Assumptions

- Natural Gas Commodity Rate (City Gate) — $4.66 per MMBtu (2011$)
- Natural Gas CHP Transportation Rate - G-EG — $0.30 per MMBtu
- Natural Gas Boiler Transportation Rate - G-NR2 — $1.54 per MMBtu
- Natural Gas Escalation Rate — Henry Hub Futures Pricing
- AFC Retail Electric Sales Rate — SMUD GS TOU
- SMUD GS TOU Escalation Rate — 4.0% per year
- SMUD Grid Electric Sales Rate — SMUD CHP FIT
- SMUD FIT Escalation Rate — Henry Hub Futures Pricing trend
- Existing Boiler Efficiency — 85.00% average efficiency
- Existing Boiler Steam Enthalpy — 1,047 Btu/lb

General Operating Assumptions

- CHP plants are base loaded all year
- One week forced outage per year during July
- One week planned outage per year during February
- Average annual capacity factor of 97.00%.
- CHP plant sells steam to AFC (i.e. offsets gas costs) at the current cost to make steam in existing gas fired boilers
- CHP plant sells electricity to AFC (i.e. offsets electric costs) at the current GS TOU rate
- CHP plant sells surplus electricity back to SMUD at the CHP FIT rate as capable
- Avoided cost of chemical disposal is $2,146,000 in 2012 and escalates 2.0% annually

[1] Incentive payment is capped at 3 MW. For projects with capacities greater than 1 MW, the first 1 MW receives 100 percent of the incentive rate; the next capacity increment above 1 MW up to 2 MW receives 50 percent of the incentive rate, while the last capacity increment above 2 MW up to 3 MW receives 25 percent of the incentive rate.

7.3 SUMMARY OF ECONOMIC ANALYSES

Burns & McDonnell developed economic models for each of the proposed CHP options to determine the total annual energy savings, annual cash flow, and return on investment. The general assumptions were combined with the technical parameters discussed in the previous sections to determine the annual operating revenues and expenses as shown in Table 7-1.

Table 7-1: CHP Plant Options – Annual Operating Revenues and Expenses

	Option 1 Combustion Turbine 2014 Year 1	Option 2 Microturbines 2014 Year 1	Option 3 Reciprocating Engines 2014 Year 1
Electric Generation Capacity			
North CHP Plant Generation Capacity (kW)	0	0	0
South CHP Plant Generation Capacity (kW)	4,379	1,764	2,229
Total Generation Capacity (kW)	4,379	1,764	2,229
Electric Generation Energy			
North CHP Plant Generation (kWh)	0	0	0
South CHP Plant Generation (kWh)	36,893,075	14,861,700	18,775,281
Total CHP Plant Generation (kWh)	36,893,075	14,861,700	18,775,281
Total Electricity Sales			
AFC Electricity Sales (kWh)	22,835,451	14,839,993	17,620,941
SMUD Grid Electricity Sales (kWh)	14,057,624	21,707	1,154,340
Total CHP Plant Generation (kWh)	36,893,075	14,861,700	18,775,281
Total CHP Plant Energy Revenues			
AFC Electricity Sales (i.e. savings) ($)	$ 2,134,300	$ 1,336,500	$ 1,601,900
SMUD Grid Electricity Sales ($)	$ 829,100	$ 1,200	$ 59,200
Total Electricity Revenues ($)	$ 2,963,400	$ 1,337,700	$ 1,661,100
Steam Generation Capacity			
North CHP Plant Generation Capacity (lbs/hr)	0	0	0
South CHP Plant Generation Capacity (lbs/hr)	14,376	6,300	4,462
Total CHP Plant Generation Capacity (lbs/hr)	14,376	6,300	4,462
Steam Generation			
North Site Steam Sales (lbs)	31,589,212	0	0
South Site Steam Sales (lbs)	66,757,126	53,077,500	37,592,350
Total Steam Sales (lbs)	98,346,337	53,077,500	37,592,350
Total CHP Plant Steam Revenues			
North Site Steam Revenue ($)	$ 190,000	$ -	$ -
South Site Steam Revenue ($)	$ 401,300	$ 320,400	$ 230,200
Total CHP Plant Steam Revenue ($)	$ 591,300	$ 320,400	$ 230,200
Waste Disposal Revenues (i.e. savings)	$ 2,232,700	$ 2,232,700	$ 2,232,700
Total Operating Revenues	**$ 5,787,400**	**$ 3,890,800**	**$ 4,124,000**
North CHP Plant Production Costs			
Total North CHP Plant Natural Gas Use (MMBtu)	0	0	0
Total North CHP Plant Natural Gas Fuel Cost ($)	$ -	$ -	$ -
South CHP Plant Production Costs			
Total South CHP Plant Natural Gas Use (MMBtu)	222,707	12,466	33,079
Total South CHP Plant Natural Gas Fuel Cost ($)	$ 808,500	$ 45,400	$ 119,800
Total CHP Plant Production Costs			
Total CHP Plant Natural Gas Fuel Use (MMBtu)	222,707	12,466	33,079
Total CHP Plant Natural Gas Fuel Cost ($)	$ 808,500	$ 45,400	$ 119,800
Total Additional Labor Cost ($)	$ 108,200	$ 108,200	$ 108,200
Total Additional Maintenance Cost ($)	$ 457,100	$ 319,800	$ 290,800
Total Operating Expenses	**$ 1,373,800**	**$ 473,400**	**$ 518,800**
EBITDA	**$ 4,413,600**	**$ 3,417,400**	**$ 3,605,200**

Burns & McDonnell summarized the results of the economic analysis in the form of pro forma cash flow statements. This analysis incorporated each CHP project's accelerated depreciation, debt financing, tax incentives and capital cost. The NPV summary of this analysis is shown in Table 7-2 and the individual models' tables are included in Appendix B.

Table 7-2: CHP Plant Options – 2014 NPV Life Cycle Costs

	Option 1 Combustion Turbine 2014 NPV	Option 2 Microturbines 2014 NPV	Option 3 Reciprocating Engine 2014 NPV
INCOME STATEMENT			
Operating Revenues			
Electric Revenues	$ 22,506,400	$ 10,532,200	$ 13,019,900
Steam Revenues	$ 5,285,100	$ 2,861,200	$ 2,047,700
Waste Disposal Revenues	$ 15,615,400	$ 15,615,400	$ 15,615,400
Total Operating Revenues	$ 43,406,900	$ 29,008,800	$ 30,683,000
Operating Expenses			
Natural Gas Expenses	$ (7,874,800)	$ (441,500)	$ (1,167,500)
Additional Labor Expense	$ (756,800)	$ (756,800)	$ (756,800)
Additional Maintenance Expense	$ (3,388,600)	$ (2,371,300)	$ (2,156,600)
Total Operating Expenses	$ (12,020,100)	$ (3,569,600)	$ (4,080,900)
EBITDA	$ 31,386,800	$ 25,439,200	$ 26,602,100
Non-Operating Expenses			
Interest Expense	$ (7,395,200)	$ (5,340,800)	$ (4,501,200)
Depreciation Expense	$ (10,508,800)	$ (7,611,600)	$ (6,395,000)
Total Non-Operating Expenses	$ (17,904,000)	$ (12,952,400)	$ (10,896,300)
EBT	$ 13,482,800	$ 12,486,900	$ 15,705,800
Taxes			
Investment Tax Credit	$ 1,433,800	$ 1,041,100	$ 872,300
Federal and State Tax Shield (Tax Liability)	$ (5,393,000)	$ (4,994,700)	$ (6,282,300)
Total Taxes	$ (3,959,200)	$ (3,953,600)	$ (5,409,900)
NET INCOME	$ 9,523,600	$ 8,533,300	$ 10,295,900
CASH FLOW STATEMENT			
Cash Flows Operating Activities			
Net Income	$ 9,523,600	$ 8,533,300	$ 10,295,900
Depreciation Expense	$ 10,508,800	$ 7,611,600	$ 6,395,000
Net Cash Flows Operating Activities	$ 20,032,400	$ 16,144,800	$ 16,690,900
Cash Flows Capital Financing and Investing Activities			
Proceeds From SGIP Rebate	$ 875,000	$ 691,000	$ 529,100
Proceeds From Debt	$ 13,964,600	$ 10,084,500	$ 8,499,800
Capital Acquisition Payments	$ (16,488,500)	$ (11,972,800)	$ (10,032,100)
Principal Payments	$ (2,872,000)	$ (2,073,400)	$ (1,748,100)
Net Cash Flows Capital Financing and Investing Activities	$ (4,520,900)	$ (3,270,700)	$ (2,751,300)
Total Net Cash Flow	$ 15,511,500	$ 12,874,100	$ 13,939,700
Discount Rate	15.00%	15.00%	15.00%

All scenarios examined in Table 7-2 provide substantial economic benefit to AFC. Option 1 provides the greatest benefit to AFC with a $15.51 million positive NPV total net cash flow. Under traditional capital budgeting concepts, given the mutually exclusive nature of these options, Option 1 would be recommended for further examination and development.

The results of all three alternatives are significantly influenced by the recognition of avoided cost associated with reduced chemical byproduct waste disposal. As previously identified in Table 3-9, the incremental capital cost associated with the waste to fuel system and LPP vaporizer are approximately $3.5 million to $4.0 million. The benefit provided by these systems is driven mainly by the reduction in cost associated with chemical byproduct waste disposal, and to a lesser degree by the reduction in the purchase of natural gas to operate the CHP facility. With an assumed benefit in chemical byproduct disposal of over $2 million per year, the payback on these facilities is exceptionally fast, even before the benefit of reduced natural gas purchases is considered. Table 7-2 shows the NPV of the avoided cost of chemical waste disposal, shown as waste disposal project revenues, to be $15.6 million.

At the request of AFC, all scenarios depicted in Table 7-2 assume the projects are funded through 100 percent debt. Burns & McDonnell recommends examining the projects on an unleveraged basis as well, as this approach eliminates the economic distortion that can result when examining results on a leveraged basis. The results under this unleveraged approach are shown in Table 7-3.

Table 7-3: CHP Plant Configurations –Unleveraged Indicators

		Option 1 Combustion Turbine	Option 2 Microturbines	Option 3 Reciprocating Engines
Leveraged 2014 NPV (Table 7.2)		$ 15,511,500	$ 12,874,100	$ 13,939,700
Unleveraged 2014 NPV	$ 9,888,600	$ 8,855,900	$ 8,067,500	$ 9,888,600
Discounted Payback Period	2 Years 9 Mos	3 Years 5 Mos	3 Years 2 Mos	2 Years 9 Mos
Modified Internal Rate of Return (MIRR)	19.18%	17.61%	18.14%	19.18%

For reference, the leveraged NPV results initially presented in Table 7-2 are shown at the top of Table 7-3. The unleveraged 2014 NPV results are shown on the second line of the table. Two observations may be drawn from the unleveraged NPV results. First, the unleveraged NPV results now favor Option 3 rather than Option 1 when the project is assumed to be equity funded rather than debt funded. Second, the overall results for each scenario are more tightly clustered than the leveraged results.

A discounted payback period was calculated for the options, which reflects the amount of time the cumulative discounted cash flows take to pay back the initial investment. The payback period results

show relatively little variance between the options, showing that all three options are projected to pay back at a similar rate.

A modified internal rate of return (MIRR) was also calculated, which represents the rate at which NPV results for each project are $0.00, assuming that project cash flows are reinvested at AFC's cost of capital. Generally speaking, MIRR and NPV results are expected to be consistent, except in conditions where cash flows are irregular or there are dramatic differences in the scale of the initial investment. As shown in Table 7-3, the unleveraged MIRR results also favor Option 3, assuming a reinvestment rate commensurate with AFC's 15 percent cost of capital. All of the unleveraged indicators support Option 3 as the most value-adding alternative, although the marginal difference among the options is relatively small.

7.4 PROJECT SELECTION FRAMEWORK

The results of the economic analyses summarized in Section 7.3 indicate that all options create substantial economic value. The precise ranking of the options depends on whether or not debt or equity funding is considered in the NPV analysis. However, in determining which project(s) merit further diligence and development, factors beyond economic results should be considered. These factors include:

- *Proven Technology*. This factor considers the strength of the feedback received from vendors, in addition to the inherent complexity of the configuration.
- *Regulatory Incentives*. This factor represents the general sensitivity to assumptions regarding Feed In Tariffs, economic incentives, and transmission interconnection.
- *Environmental Permitting*. This factor depicts risk associated with the permitting of waste fuel burning.
- *Commodity Pricing*. This factor captures risk associated with gas and electric pricing assumptions.
- *Power Reliability*. This factor acknowledges the benefit associated with each configuration's ability and scale to serve as an alternative power source.

Table 7-4 considers the findings of the economic analysis, in addition to judgments regarding factors described above, to develop a score for each option.

Table 7-4: Scoring Matrix – Leveraged NPV

Metric	Leveraged Economic Assessment	Proven Technology	Regulatory Incentives	Environmental Permitting	Commodity Pricing	Power Reliability	Score
Maximum Potential Score	10	5	5	5	5	5	35
Option 1: Combustion Turbine	10	3	3	4	3	5	28
Option 2: Microturbine	8	5	5	4	5	3	30
Option 3: Reciprocating Engine	9	3	5	3	5	3	28

The screening process summarized in Table 7-4 indicates Option 2 as most favorable. Option 2 benefits from greater confidence in the waste to fuel compatibility and is less influenced by changes in incentives or commodity prices. These advantages are sufficient to overcome the marginal difference in the economic analysis.

Ranking for the economic analysis used in Table 7-4 are based on the leveraged results. Using unleveraged results does not change the results for Option 2, but does decrease the score for Option 1 and increase the score for Option 2. Table 7-5 presents the unleveraged scoring matrix.

Table 7-5: Scoring Matrix – Unleveraged NPV

Metric	Unleveraged Economic Assessment	Proven Technology	Regulatory Incentives	Environmental Permitting	Commodity Pricing	Power Reliability	Score
Maximum Potential Score	10	5	5	5	5	5	35
Option 1: Combustion Turbine	9	3	3	4	3	5	27
Option 2: Microturbine	8	5	5	4	5	3	30
Option 3: Reciprocating Engine	10	3	5	3	5	3	29

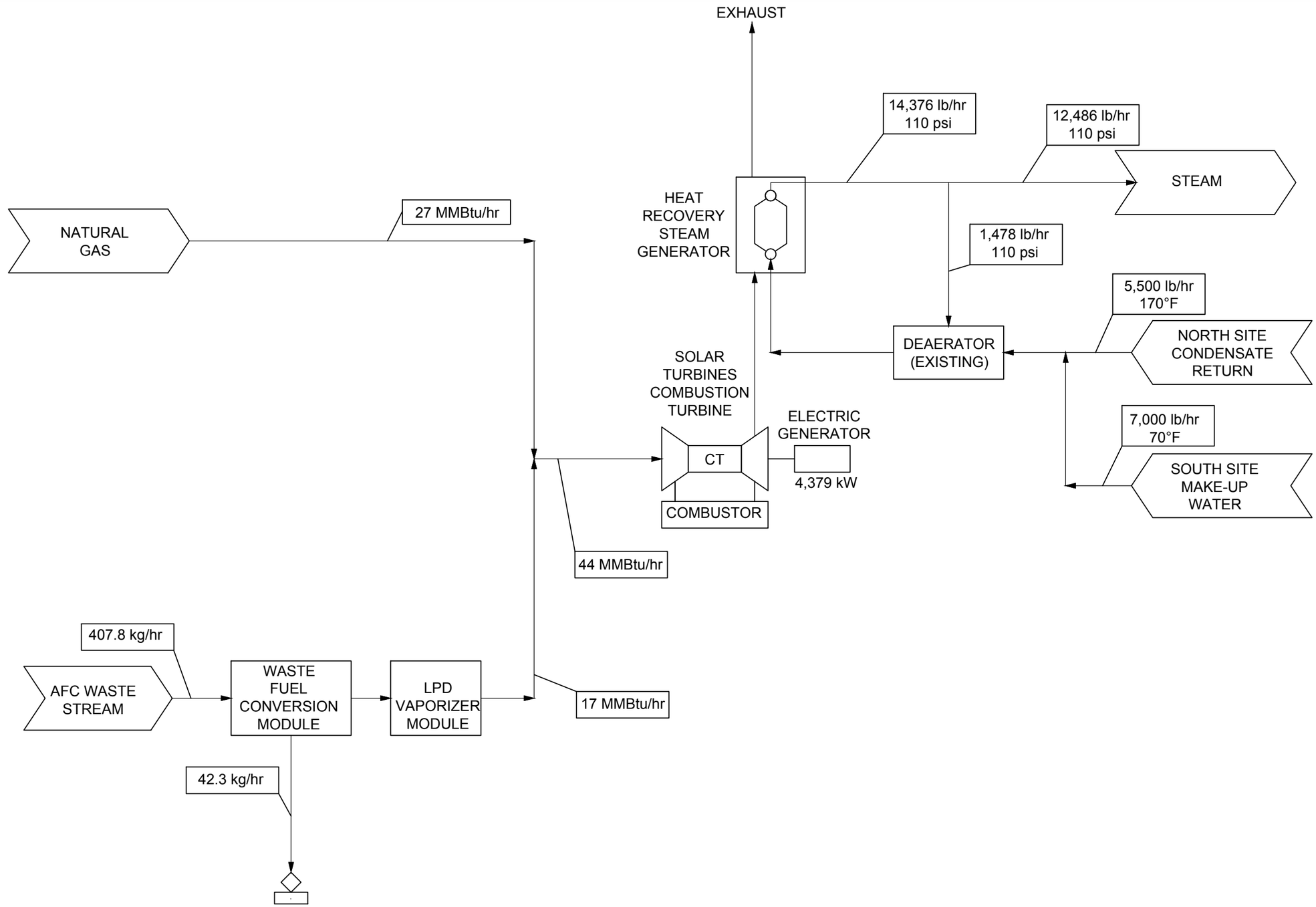
The scoring of the factors in Table 7-4 does involve a level of professional judgment and opinion. The overall difference among the options is notably narrow, suggesting all options may represent reasonable alternatives worthy of consideration.

7.5 CONCLUSIONS

All options evaluated in this report provide substantial economic value, significantly impacted by the ability to lower the cost of chemical byproduct waste disposal involved in the current AFC operation. Based on the scoring matrix presented in Table 7-4, Option 2 with the Capstone microturbines offers the best balance of economic value, risk, and other less tangible factors, and merits further diligence and development.

* * * * *

APPENDIX A – PROCESS FLOW DIAGRAMS



DATE:	3/16/12
DRAWN:	JAE
DESIGNED:	AY

Burns & McDonnell
SINCE 1898

AMPEC FINE CHEMICALS
BY PRODUCT FUEL AND
CHP FEASABILITY STUDY
OPTION 1 - COMBUSTION
TURBINE
SK-001

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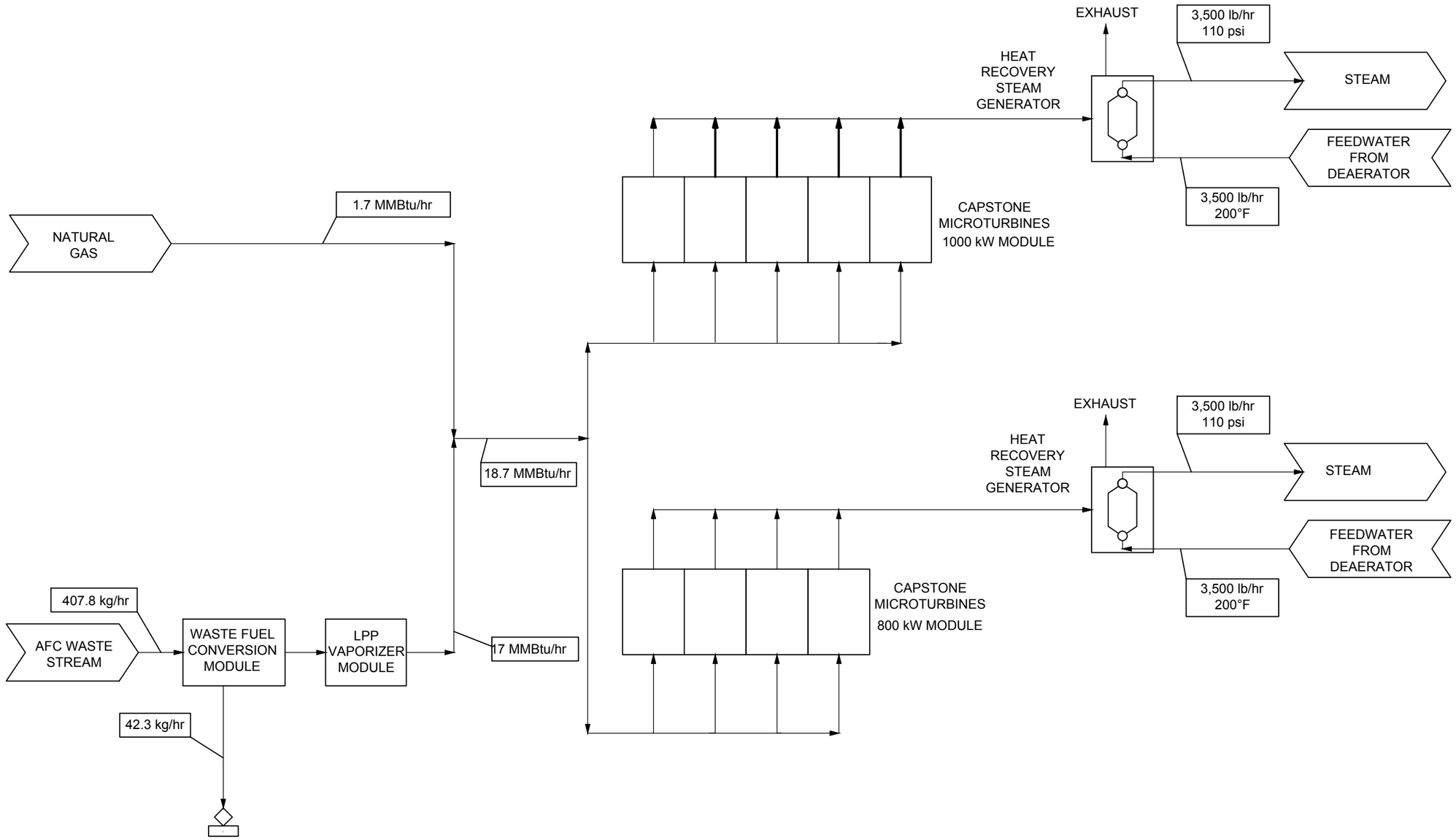

DATE:	3/16/12
DRAWN:	JAE
DESIGNED:	AY

Burns & McDonnell SINCE 1898

AMPAC FINE CHEMICALS

BY PRODUCT FUEL AND CHP FEASABILITY STUDY OPTION 2 MICROTURBINE

SK-002

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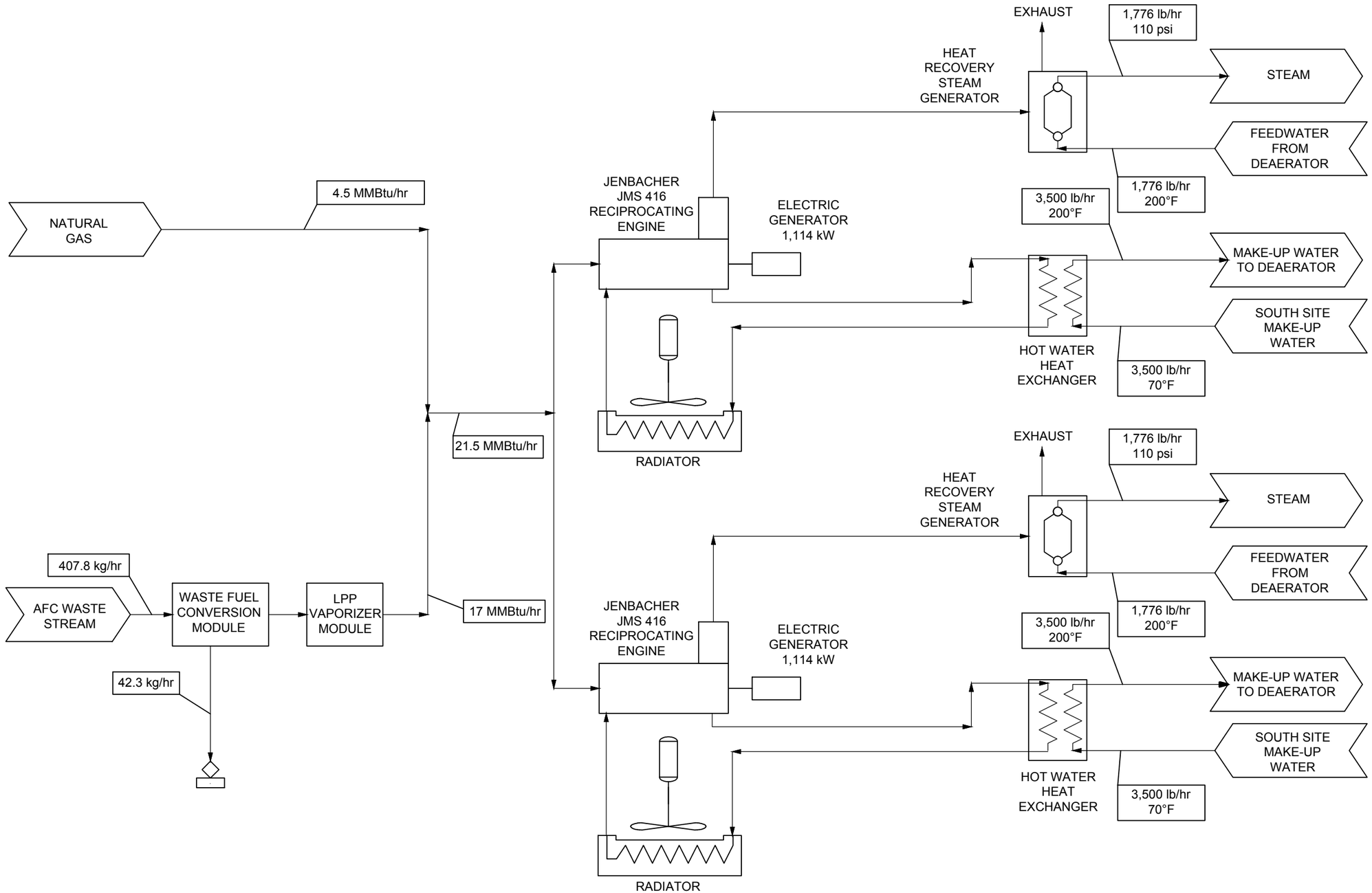

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DESIGNED:	AY

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AMPAC FINE CHEMICALS

BY PRODUCT FUEL AND CHP FEASABILITY STUDY OPTION 3 RECIPROCATING ENGINES

SK-003

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APPENDIX B – FINANCIAL MODELING RESULTS

OPTION 1 – SINGLE CHP PLANT WITH COMBUSTION TURBINE

1.0 CHP ASSUMPTIONS

	SELECT CONFIGURATION			Option 1			Option 2			Option 3		
Configuration	**Option 1**											
Project Description	**Single CHP Plant Located at South Site - Supplying Steam to North and South Sites**			Single CHP Plant Located at South Site - Supplying Steam to North and South Sites			Single CHP Plant Located at South Site - No Steam Interconnection			Single CHP Plant Located at South Site - No Steam Interconnection		
Site	**North Site**	**South Site**	**Total**	North Site	South Site	Total	North Site	South Site	Total	North Site	South Site	Total
Estimated Average Electrical Load (kW)	**1,500**	**1,500**	**3,000**	1,500	1,500	3,000		1,500	1,500		1,500	1,500
Maximum CHP Electric Generation (kW)	**5,000**	**5,000**	**5,000**	5,000	5,000	5,000		5,000	5,000		5,000	5,000
Minimum Steam Load (lb/hr)	**5,500**	**7,000**	**12,500**	5,500	7,000	12,500		7,000	7,000		7,000	7,000
Average Steam Load (lb/hr)	**8,000**	**15,000**	**23,000**	8,000	15,000	23,000		15,000	15,000		15,000	15,000
Max Steam Load (lb/hr)	**12,000**	**25,000**	**37,000**	12,000	25,000	37,000		25,000	25,000		25,000	25,000
Power Generation Technology	**0**	**Combustion Turbine**	**Combustion Turbine**		Combustion Turbine	Combustion Turbine		Microturbine	Microturbine		Reciprocating Engine	Reciprocating Engine
Manufacturer	**0**	**Solar Turbines**	**Solar Turbines**		Solar Turbines	Solar Turbines		Capstone	Capstone		GE	GE
Prime Mover	**0**	**Mercury 50**	**Mercury 50**		Mercury 50	Mercury 50		C200 x 9	C200 x 9		Jenbacher JMS 416	Jenbacher JMS 416
Number of Units	**0**	**1**	**1**		1	1		1	1		2	2
Gross Power Generation per Unit (kW)	**0**	**4,419**	**4,419**		4,419	4,419		1,800	1,800		1,137	1,137
Aux Load per Unit (kW)	**0**	**-40**	**-40**		-40	-40		-36	-36		-23	-23
Net Power Generation per Unit (kW)	**0**	**4,379**	**4,379**		4,379	4,379		1,764	1,764		1,114	1,114
Total Power Generation (kW)	**0**	**4,379**	**4,379**		4,379	4,379		1,764	1,764		2,229	2,229
Fuel Input per Unit LHV (MMBtu/hr)	**0.00**	**40.10**	**40.10**		40.10	40.10		17.00	17.00		9.78	9.78
Fuel Input per Unit HHV (MMBtu/hr)	**0.00**	**44.11**	**44.11**		44.11	44.11		18.70	18.70		10.75	10.75
Prime Mover Heat Rate LHV (Btu/kWh)	**0**	**9,157**	**9,157**		9,157	9,157		9,637	9,637		8,774	8,774
Prime Mover Heat Rate HHV (Btu/kWh)	**0**	**10,073**	**10,073**		10,073	10,073		10,601	10,601		9,651	9,651
Total Prime Mover Fuel Input LHV (MMBtu/hr)	**0.0**	**40.1**	**40.1**		40.1	40.1		17.0	17.0		19.6	19.6
Total Prime Mover Fuel Input HHV (MMBtu/hr)	**0.0**	**44.1**	**44.1**		44.1	44.1		18.7	18.7		21.5	21.5
Federal Investment Tax Credit (%)	**0%**	**10%**	**10%**		10%	10%		10%	10%		10%	10%
Steam Generation Technology	**0**	**HRSG**	**HRSG**		HRSG	HRSG		HRSG	HRSG		HRSG	HRSG
Number of Units	**0**	**1**	**1**		1	1		1	1		2	2
Steam Generation per Unit (lb/hr)	**0**	**14,376**	**14,376**		14,376	14,376		6,300	6,300		3,552	3,552
Total Steam Generation (lb/hr)	**0**	**14,376**	**14,376**	0	14,376	14,376		6,300	6,300	0	7,104	7,104
Total Project Capital Cost ($)	**$ -**	**$ 16,488,500**	**$ 16,488,500**	$ -	$ 16,488,500	$ 16,488,500		$ 11,972,800	$ 11,972,800		$ 10,032,100	$ 10,032,100
SGIP Incentive ($)	**$ -**	**$ (875,000)**	**$ (875,000)**	$ -	$ (875,000)	$ (875,000)	$ -	$ (691,000)	$ (691,000)	$ -	$ (529,065)	$ (529,065)
Investment Tax Credit ($)	**$ -**	**$ (1,648,900)**	**$ (1,648,900)**	$ -	$ (1,648,900)	$ (1,648,900)	$ -	$ (1,197,300)	$ (1,197,300)	$ -	$ (1,003,200)	$ (1,003,200)
Net Project Capital Cost ($)	**$ -**	**$ 13,964,600**	**$ 13,964,600**	$ -	$ 13,964,600	$ 13,964,600		$ 10,084,500	$ 10,084,500	$ -	$ 8,499,835	$ 8,499,835
Prime Mover Maintenance Cost ($/unit)	**$ -**	**$ 430,900**	**$ 430,900**		$ 430,900	$ 430,900		$ 301,500	$ 301,500	$ -	$ 137,100	$ 137,100
Number of Units	**0**	**1**	**1**	0	1	1		1	1	0	2	2
Total Prime Mover Maintenance Cost ($)	**$ -**	**$ 430,900**	**$ 430,900**	$ -	$ 430,900	$ 430,900		$ 301,500	$ 301,500	$ -	$ 274,200	$ 274,200
Additional Managers	**0**	**0**	**0**	0	0	0		0	0	0	0	0
Additional Operators	**0**	**0**	**0**	0	0	0		0	0	0	0	0
Additional Maintenance	**0**	**1**	**1**	0	1	1		1	1	0	1	1
Typical Chemical Waste Volume (kg/yr)	**0**	**3,572,000**	**3,572,000**	0	3,572,000	3,572,000	0	3,572,000	3,572,000	0	3,572,000	3,572,000
Anticipated Chemical Waste Volume post Waste-to-Fule Facility (kg/yr)	**0**	**370,628**	**370,628**	0	370,628	370,628	0	370,628	370,628	0	370,628	370,628
Fuel Input provided by WTF Vaporizer (MMBtu/hr)	**0.00**	**17.00**	**17.00**		17.00	17.00		17.00	17.00		17.00	17.00

2.0 GENERAL ASSUMPTIONS

Inflation Rate	2.00%
O&M Escalation Rate	3.00%
Labor Escalation Rate	2.00%
Debt Financed (%)	100.00%
Equity Financed (%)	0.00%
Discount Rate	15.00%
Debt Interest Rate	10.00%
Debt Term (years)	20.00
Marginal Tax Rate	40.00%
Depreciation	MACRS 5-Year
Manager Labor Rate ($/hr)	$ 100.00
Operator Labor Rate ($/hr)	$ 50.00
Maintenance Labor Rate ($/hr)	$ 50.00

2.1 MONTHLY ASSUMPTIONS

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
PG&E Natural Gas Rates												
Natural Gas Unit Fuel Price City Gate ($/MMBtu)	$6.37/MMBtu	$5.73/MMBtu	$5.15/MMBtu	$4.46/MMBtu	$4.52/MMBtu	$4.29/MMBtu	$4.66/MMBtu	$4.44/MMBtu	$3.63/MMBtu	$4.09/MMBtu	$3.96/MMBtu	$4.65/MMBtu
Transportation G-NR2 Up to 400 MMBtu ($/MMBtu)	$4.02/MMBtu	$4.02/MMBtu	$4.02/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$4.02/MMBtu	$4.02/MMBtu
Transportation G-NR2 Over 400 MMBtu ($/MMBtu)	$1.57/MMBtu	$1.57/MMBtu	$1.57/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.57/MMBtu	$1.57/MMBtu
Transporation G-EG ($/MMBtu)	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu
SMUD - GS TOU Rate [1]												
Super Peak Energy Rate ($/kWh)						$0.12030/kWh	$0.12030/kWh	$0.12030/kWh	$0.12030/kWh			
On Peak Energy Rate ($/kWh)	$0.08830/kWh	$0.08830/kWh	$0.08830/kWh	$0.08830/kWh	$0.08830/kWh	$0.10570/kWh	$0.10570/kWh	$0.10570/kWh	$0.10570/kWh	$0.08830/kWh	$0.08830/kWh	$0.08830/kWh
Off Peak Energy Rate ($/kWh)	$0.06990/kWh	$0.06990/kWh	$0.06990/kWh	$0.06990/kWh	$0.06990/kWh	$0.08630/kWh	$0.08630/kWh	$0.08630/kWh	$0.08630/kWh	$0.06990/kWh	$0.06990/kWh	$0.06990/kWh
SMUD - FIT Rate [2]												
Super Peak Energy Rate ($/kWh)	$0.06062/kWh	$0.06062/kWh	$0.05051/kWh	$0.05051/kWh	$0.05051/kWh	$0.22354/kWh	$0.22354/kWh	$0.22354/kWh	$0.22354/kWh	$0.06062/kWh	$0.06062/kWh	$0.06062/kWh
On Peak Energy Rate ($/kWh)	$0.05509/kWh	$0.05509/kWh	$0.04858/kWh	$0.04858/kWh	$0.04858/kWh	$0.05826/kWh	$0.05826/kWh	$0.05826/kWh	$0.05826/kWh	$0.05509/kWh	$0.05509/kWh	$0.05509/kWh
Off Peak Energy Rate ($/kWh)	$0.04334/kWh	$0.04334/kWh	$0.03740/kWh	$0.03740/kWh	$0.03740/kWh	$0.04992/kWh	$0.04992/kWh	$0.04992/kWh	$0.04992/kWh	$0.04334/kWh	$0.04334/kWh	$0.04334/kWh
Steam Enthalphy (Btu/lb)	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047
Existing Boiler Efficiency (%)	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%

2.2 ANNUAL ASSUMPTIONS

	2012	2013	2014 Year 1	2015 Year 2	2016 Year 3	2017 Year 4	2018 Year 5	2019 Year 6	2020 Year 7	2021 Year 8	2022 Year 9	2023 Year 10	2024 Year 11	2025 Year 12	2026 Year 13	2027 Year 14
PG&E Natural Gas Rates																
Natural Gas Unit Fuel Price City Gate ($/MMBtu) [3]	$4.66/MMBtu	$4.29/MMBtu	$3.31/MMBtu	$4.15/MMBtu	$4.55/MMBtu	$4.80/MMBtu	$5.03/MMBtu	$5.26/MMBtu	$5.50/MMBtu	$5.76/MMBtu	$6.01/MMBtu	$6.28/MMBtu	$6.56/MMBtu	$6.86/MMBtu	$7.16/MMBtu	$7.48/MMBtu
Escalation (%)		-8.04%	-22.76%	25.30%	9.64%	5.54%	4.74%	4.66%	4.58%	4.55%	4.48%	4.48%	4.48%	4.48%	4.48%	4.48%
Transportation G-NR2 ($/MMBtu) [4]	$1.54/MMBtu	$1.55/MMBtu	$1.57/MMBtu	$1.58/MMBtu	$1.60/MMBtu	$1.62/MMBtu	$1.63/MMBtu	$1.65/MMBtu	$1.67/MMBtu	$1.68/MMBtu	$1.70/MMBtu	$1.72/MMBtu	$1.73/MMBtu	$1.75/MMBtu	$1.77/MMBtu	$1.79/MMBtu
Transporation G-EG ($/MMBtu) [5]	$0.31/MMBtu	$0.32/MMBtu	$0.32/MMBtu	$0.32/MMBtu	$0.32/MMBtu	$0.33/MMBtu	$0.33/MMBtu	$0.33/MMBtu	$0.34/MMBtu	$0.34/MMBtu	$0.34/MMBtu	$0.35/MMBtu	$0.35/MMBtu	$0.36/MMBtu	$0.36/MMBtu	$0.36/MMBtu
Escalation (%)		1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
SMUD - GS TOU Rate [6]																
Super Peak Energy Rate ($/kWh)	$0.12028/kWh	$0.12357/kWh	$0.12851/kWh	$0.13365/kWh	$0.13899/kWh	$0.14455/kWh	$0.15034/kWh	$0.15635/kWh	$0.16260/kWh	$0.16911/kWh	$0.17587/kWh	$0.18291/kWh	$0.19022/kWh	$0.19783/kWh	$0.20575/kWh	$0.21398/kWh
Escalation (%)		2.73%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%
On Peak Energy Rate ($/kWh)	$0.09153/kWh	$0.09403/kWh	$0.09779/kWh	$0.10170/kWh	$0.10577/kWh	$0.11000/kWh	$0.11440/kWh	$0.11897/kWh	$0.12373/kWh	$0.12868/kWh	$0.13383/kWh	$0.13918/kWh	$0.14475/kWh	$0.15054/kWh	$0.15656/kWh	$0.16282/kWh
Escalation (%)		2.73%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%
Off Peak Energy Rate ($/kWh)	$0.07575/kWh	$0.07782/kWh	$0.08093/kWh	$0.08417/kWh	$0.08753/kWh	$0.09103/kWh	$0.09468/kWh	$0.09846/kWh	$0.10240/kWh	$0.10650/kWh	$0.11076/kWh	$0.11519/kWh	$0.11979/kWh	$0.12459/kWh	$0.12957/kWh	$0.13475/kWh
Escalation (%)		2.73%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%
SMUD - FIT Rate [7]																
Super Peak Energy Rate ($/kWh)	$0.08993/kWh	$0.09225/kWh	$0.10115/kWh	$0.10286/kWh	$0.10461/kWh	$0.10639/kWh	$0.10820/kWh	$0.11004/kWh	$0.11191/kWh	$0.11381/kWh	$0.11575/kWh	$0.11772/kWh	$0.11972/kWh	$0.12175/kWh	$0.12382/kWh	$0.12593/kWh
Escalation (%)		2.58%	9.64%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%
On Peak Energy Rate ($/kWh)	$0.05417/kWh	$0.05536/kWh	$0.06070/kWh	$0.06173/kWh	$0.06278/kWh	$0.06385/kWh	$0.06493/kWh	$0.06604/kWh	$0.06716/kWh	$0.06830/kWh	$0.06946/kWh	$0.07064/kWh	$0.07185/kWh	$0.07307/kWh	$0.07431/kWh	$0.07557/kWh
Escalation (%)		2.21%	9.64%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%
Off Peak Energy Rate ($/kWh)	$0.04371/kWh	$0.04481/kWh	$0.04912/kWh	$0.04996/kWh	$0.05081/kWh	$0.05167/kWh	$0.05255/kWh	$0.05344/kWh	$0.05435/kWh	$0.05528/kWh	$0.05622/kWh	$0.05717/kWh	$0.05814/kWh	$0.05913/kWh	$0.06014/kWh	$0.06116/kWh
Escalation (%)		2.50%	9.64%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%
Steam Enthalph (Btu/lb)	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047
Existing Boiler Efficiency (%)	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%

[1] SMUD GS TOU GUT_L rates are based on Jan 1, 2012 rates.
[2] SMUD FIT Rates are based on rates approved for 2012 & 2013 as effective 1/1/2011.
[3] Based on historical correlation, City Gate natural gas price is estimated to be 8 percent higher than the Henry Hub monthly gas futures on Feb 22, 2012.
[4] Natural Gas Transportation G-NR2 rate is assumed for the existing boilers gas purchases.
[5] Natural Gas Transportation G-EG rate is assumed for the CHP gas purchases.
[6] SMUD - GS TOU rate escalation for 2013 is based on SMUD longterm forecast. Future prices are estimated to be 4 percent higher annually.
[7] SMUD - FIT rate for 2013 is based on average increases in SMUD FIT tariffs. Escalation beyond 2013 is based on FIT contract escalation rate of 1.70%.

3.0 MARKET ASSUMPTIONS

	2012	2013	2014 Year 1	2015 Year 2	2016 Year 3	2017 Year 4	2018 Year 5	2019 Year 6	2020 Year 7	2021 Year 8	2022 Year 9	2023 Year 10	2024 Year 11	2025 Year 12	2026 Year 13	2027 Year 14
Gas Price $/MMBtu [1]																
January	$6.37/MMBtu	$4.26/MMBtu	$3.52/MMBtu	$4.05/MMBtu	$4.63/MMBtu	$4.94/MMBtu	$5.17/MMBtu	$5.41/MMBtu	$5.67/MMBtu	$5.93/MMBtu	$6.20/MMBtu	$6.48/MMBtu	$6.77/MMBtu	$7.07/MMBtu	$7.39/MMBtu	$7.72/MMBtu
February	$5.73/MMBtu	$4.34/MMBtu	$3.19/MMBtu	$4.06/MMBtu	$4.62/MMBtu	$4.91/MMBtu	$5.14/MMBtu	$5.38/MMBtu	$5.64/MMBtu	$5.90/MMBtu	$6.17/MMBtu	$6.44/MMBtu	$6.73/MMBtu	$7.03/MMBtu	$7.35/MMBtu	$7.68/MMBtu
March	$5.15/MMBtu	$4.08/MMBtu	$2.85/MMBtu	$4.05/MMBtu	$4.56/MMBtu	$4.83/MMBtu	$5.06/MMBtu	$5.30/MMBtu	$5.55/MMBtu	$5.82/MMBtu	$6.08/MMBtu	$6.36/MMBtu	$6.64/MMBtu	$6.94/MMBtu	$7.25/MMBtu	$7.57/MMBtu
April	$4.46/MMBtu	$4.53/MMBtu	$3.00/MMBtu	$4.01/MMBtu	$4.41/MMBtu	$4.66/MMBtu	$4.87/MMBtu	$5.10/MMBtu	$5.33/MMBtu	$5.57/MMBtu	$5.81/MMBtu	$6.07/MMBtu	$6.34/MMBtu	$6.63/MMBtu	$6.93/MMBtu	$7.24/MMBtu
May	$4.52/MMBtu	$4.47/MMBtu	$3.11/MMBtu	$4.05/MMBtu	$4.42/MMBtu	$4.67/MMBtu	$4.88/MMBtu	$5.11/MMBtu	$5.34/MMBtu	$5.58/MMBtu	$5.82/MMBtu	$6.08/MMBtu	$6.36/MMBtu	$6.64/MMBtu	$6.94/MMBtu	$7.25/MMBtu
June	$4.29/MMBtu	$4.56/MMBtu	$3.21/MMBtu	$4.10/MMBtu	$4.45/MMBtu	$4.69/MMBtu	$4.91/MMBtu	$5.14/MMBtu	$5.36/MMBtu	$5.61/MMBtu	$5.85/MMBtu	$6.11/MMBtu	$6.39/MMBtu	$6.67/MMBtu	$6.97/MMBtu	$7.28/MMBtu
July	$4.66/MMBtu	$4.60/MMBtu	$3.29/MMBtu	$4.14/MMBtu	$4.49/MMBtu	$4.73/MMBtu	$4.95/MMBtu	$5.17/MMBtu	$5.40/MMBtu	$5.64/MMBtu	$5.89/MMBtu	$6.15/MMBtu	$6.43/MMBtu	$6.71/MMBtu	$7.02/MMBtu	$7.33/MMBtu
August	$4.44/MMBtu	$4.54/MMBtu	$3.33/MMBtu	$4.16/MMBtu	$4.51/MMBtu	$4.74/MMBtu	$4.97/MMBtu	$5.20/MMBtu	$5.43/MMBtu	$5.67/MMBtu	$5.92/MMBtu	$6.19/MMBtu	$6.47/MMBtu	$6.75/MMBtu	$7.06/MMBtu	$7.37/MMBtu
September	$3.63/MMBtu	$4.19/MMBtu	$3.34/MMBtu	$4.16/MMBtu	$4.51/MMBtu	$4.74/MMBtu	$4.97/MMBtu	$5.21/MMBtu	$5.44/MMBtu	$5.68/MMBtu	$5.94/MMBtu	$6.20/MMBtu	$6.48/MMBtu	$6.77/MMBtu	$7.07/MMBtu	$7.39/MMBtu
October	$4.09/MMBtu	$4.15/MMBtu	$3.40/MMBtu	$4.20/MMBtu	$4.55/MMBtu	$4.78/MMBtu	$5.01/MMBtu	$5.24/MMBtu	$5.49/MMBtu	$5.73/MMBtu	$6.00/MMBtu	$6.26/MMBtu	$6.54/MMBtu	$6.84/MMBtu	$7.14/MMBtu	$7.46/MMBtu
November	$3.96/MMBtu	$3.87/MMBtu	$3.59/MMBtu	$4.30/MMBtu	$4.63/MMBtu	$4.87/MMBtu	$5.10/MMBtu	$5.35/MMBtu	$5.60/MMBtu	$5.85/MMBtu	$6.12/MMBtu	$6.40/MMBtu	$6.68/MMBtu	$6.98/MMBtu	$7.29/MMBtu	$7.62/MMBtu
December	$4.65/MMBtu	$3.86/MMBtu	$3.90/MMBtu	$4.52/MMBtu	$4.83/MMBtu	$5.07/MMBtu	$5.31/MMBtu	$5.56/MMBtu	$5.82/MMBtu	$6.08/MMBtu	$6.35/MMBtu	$6.64/MMBtu	$6.93/MMBtu	$7.24/MMBtu	$7.57/MMBtu	$7.91/MMBtu
Average	$4.66/MMBtu	$4.29/MMBtu	$3.31/MMBtu	$4.15/MMBtu	$4.55/MMBtu	$4.80/MMBtu	$5.03/MMBtu	$5.26/MMBtu	$5.50/MMBtu	$5.76/MMBtu	$6.01/MMBtu	$6.28/MMBtu	$6.56/MMBtu	$6.86/MMBtu	$7.16/MMBtu	$7.48/MMBtu
		-8.04%	-22.76%	25.30%	9.64%	5.54%	4.74%	4.66%	4.58%	4.55%	4.48%	4.48%	4.48%	4.48%	4.48%	4.48%
On Peak Energy ($/MWh) [2]																
January	$66.91/MWh	$68.73/MWh	$68.65/MWh	$70.00/MWh	$73.36/MWh	$73.45/MWh	$75.18/MWh	$78.91/MWh	$80.39/MWh	$82.41/MWh	$83.88/MWh	$85.68/MWh	$86.77/MWh	$89.39/MWh	$91.89/MWh	$94.58/MWh
February	$65.84/MWh	$67.60/MWh	$64.98/MWh	$66.25/MWh	$69.43/MWh	$69.52/MWh	$71.16/MWh	$74.69/MWh	$76.09/MWh	$78.00/MWh	$79.39/MWh	$81.09/MWh	$82.13/MWh	$84.61/MWh	$86.97/MWh	$89.52/MWh
March	$64.20/MWh	$65.86/MWh	$62.39/MWh	$63.78/MWh	$66.85/MWh	$66.93/MWh	$68.50/MWh	$71.91/MWh	$73.25/MWh	$75.09/MWh	$76.43/MWh	$78.07/MWh	$79.07/MWh	$81.46/MWh	$83.73/MWh	$86.18/MWh
April	$56.60/MWh	$57.87/MWh	$55.16/MWh	$56.94/MWh	$59.67/MWh	$59.75/MWh	$61.15/MWh	$64.19/MWh	$65.39/MWh	$67.03/MWh	$68.23/MWh	$69.69/MWh	$70.58/MWh	$72.72/MWh	$74.74/MWh	$76.93/MWh
May	$57.86/MWh	$59.19/MWh	$54.87/MWh	$56.73/MWh	$59.46/MWh	$59.54/MWh	$60.93/MWh	$63.96/MWh	$65.16/MWh	$66.80/MWh	$67.99/MWh	$69.44/MWh	$70.33/MWh	$72.46/MWh	$74.48/MWh	$76.66/MWh
June	$60.83/MWh	$62.31/MWh	$58.99/MWh	$60.99/MWh	$63.91/MWh	$64.00/MWh	$65.50/MWh	$68.75/MWh	$70.04/MWh	$71.80/MWh	$73.08/MWh	$74.65/MWh	$75.60/MWh	$77.89/MWh	$80.06/MWh	$82.40/MWh
July	$76.24/MWh	$78.67/MWh	$70.73/MWh	$73.42/MWh	$76.94/MWh	$77.04/MWh	$78.85/MWh	$82.77/MWh	$84.32/MWh	$86.44/MWh	$87.98/MWh	$89.86/MWh	$91.02/MWh	$93.77/MWh	$96.38/MWh	$99.20/MWh
August	$76.29/MWh	$78.73/MWh	$72.01/MWh	$74.82/MWh	$78.42/MWh	$78.52/MWh	$80.36/MWh	$84.35/MWh	$85.94/MWh	$88.09/MWh	$89.66/MWh	$91.59/MWh	$92.76/MWh	$95.56/MWh	$98.22/MWh	$101.10/MWh
September	$69.87/MWh	$71.87/MWh	$67.10/MWh	$70.28/MWh	$73.66/MWh	$73.75/MWh	$75.48/MWh	$79.24/MWh	$80.72/MWh	$82.75/MWh	$84.22/MWh	$86.03/MWh	$87.13/MWh	$89.76/MWh	$92.26/MWh	$94.97/MWh
October	$66.81/MWh	$68.63/MWh	$64.14/MWh	$67.37/MWh	$70.61/MWh	$70.70/MWh	$72.36/MWh	$75.95/MWh	$77.38/MWh	$79.32/MWh	$80.73/MWh	$82.46/MWh	$83.52/MWh	$86.04/MWh	$88.44/MWh	$91.03/MWh
November	$67.34/MWh	$69.19/MWh	$65.26/MWh	$69.17/MWh	$72.49/MWh	$72.59/MWh	$74.29/MWh	$77.98/MWh	$79.45/MWh	$81.44/MWh	$82.89/MWh	$84.67/MWh	$85.75/MWh	$88.34/MWh	$90.81/MWh	$93.47/MWh
December	$68.45/MWh	$70.36/MWh	$67.19/MWh	$71.12/MWh	$74.53/MWh	$74.63/MWh	$76.38/MWh	$80.17/MWh	$81.68/MWh	$83.73/MWh	$85.22/MWh	$87.05/MWh	$88.16/MWh	$90.82/MWh	$93.36/MWh	$96.09/MWh
Average On Peak ($/MWh)	$66.44/MWh	$68.25/MWh	$64.29/MWh	$66.74/MWh	$69.94/MWh	$70.04/MWh	$71.68/MWh	$75.24/MWh	$76.65/MWh	$78.58/MWh	$79.98/MWh	$81.69/MWh	$82.74/MWh	$85.24/MWh	$87.61/MWh	$90.18/MWh
		2.73%	-5.81%	3.81%	4.80%	0.13%	2.35%	4.97%	1.87%	2.51%	1.78%	2.14%	1.28%	3.02%	2.79%	2.93%
Off Peak Energy ($/MWh) [2]																
January	$52.07/MWh	$53.62/MWh	$52.67/MWh	$53.71/MWh	$56.29/MWh	$56.36/MWh	$57.68/MWh	$60.55/MWh	$61.68/MWh	$63.23/MWh	$64.36/MWh	$65.74/MWh	$66.58/MWh	$68.59/MWh	$70.50/MWh	$72.57/MWh
February	$51.80/MWh	$53.33/MWh	$51.94/MWh	$52.96/MWh	$55.50/MWh	$55.57/MWh	$56.88/MWh	$59.70/MWh	$60.82/MWh	$62.35/MWh	$63.46/MWh	$64.82/MWh	$65.65/MWh	$67.64/MWh	$69.52/MWh	$71.56/MWh
March	$49.99/MWh	$51.40/MWh	$49.74/MWh	$50.85/MWh	$53.29/MWh	$53.36/MWh	$54.61/MWh	$57.33/MWh	$58.40/MWh	$59.87/MWh	$60.94/MWh	$62.24/MWh	$63.04/MWh	$64.94/MWh	$66.75/MWh	$68.71/MWh
April	$42.21/MWh	$43.18/MWh	$43.01/MWh	$44.39/MWh	$46.52/MWh	$46.58/MWh	$47.67/MWh	$50.04/MWh	$50.98/MWh	$52.26/MWh	$53.19/MWh	$54.33/MWh	$55.03/MWh	$56.69/MWh	$58.27/MWh	$59.97/MWh
May	$40.05/MWh	$40.91/MWh	$39.52/MWh	$40.87/MWh	$42.83/MWh	$42.89/MWh	$43.89/MWh	$46.07/MWh	$46.94/MWh	$48.12/MWh	$48.97/MWh	$50.02/MWh	$50.66/MWh	$52.19/MWh	$53.65/MWh	$55.22/MWh
June	$39.74/MWh	$40.59/MWh	$39.79/MWh	$41.14/MWh	$43.11/MWh	$43.17/MWh	$44.18/MWh	$46.38/MWh	$47.25/MWh	$48.43/MWh	$49.30/MWh	$50.35/MWh	$51.00/MWh	$52.54/MWh	$54.00/MWh	$55.59/MWh
July	$46.15/MWh	$47.33/MWh	$48.72/MWh	$50.58/MWh	$53.01/MWh	$53.08/MWh	$54.32/MWh	$57.02/MWh	$58.09/MWh	$59.55/MWh	$60.61/MWh	$61.91/MWh	$62.70/MWh	$64.59/MWh	$66.39/MWh	$68.34/MWh
August	$51.42/MWh	$52.92/MWh	$50.32/MWh	$52.28/MWh	$54.79/MWh	$54.86/MWh	$56.15/MWh	$58.94/MWh	$60.05/MWh	$61.56/MWh	$62.65/MWh	$63.99/MWh	$64.82/MWh	$66.77/MWh	$68.63/MWh	$70.64/MWh
September	$50.45/MWh	$51.89/MWh	$49.82/MWh	$52.19/MWh	$54.69/MWh	$54.76/MWh	$56.05/MWh	$58.83/MWh	$59.93/MWh	$61.44/MWh	$62.53/MWh	$63.87/MWh	$64.69/MWh	$66.65/MWh	$68.50/MWh	$70.51/MWh
October	$50.36/MWh	$51.79/MWh	$48.64/MWh	$51.09/MWh	$53.55/MWh	$53.62/MWh	$54.87/MWh	$57.60/MWh	$58.68/MWh	$60.15/MWh	$61.22/MWh	$62.54/MWh	$63.34/MWh	$65.25/MWh	$67.07/MWh	$69.03/MWh
November	$50.92/MWh	$52.39/MWh	$49.81/MWh	$52.80/MWh	$55.33/MWh	$55.41/MWh	$56.71/MWh	$59.52/MWh	$60.64/MWh	$62.16/MWh	$63.27/MWh	$64.63/MWh	$65.46/MWh	$67.43/MWh	$69.31/MWh	$71.34/MWh
December	$52.33/MWh	$53.90/MWh	$52.45/MWh	$55.51/MWh	$58.17/MWh	$58.25/MWh	$59.62/MWh	$62.58/MWh	$63.75/MWh	$65.35/MWh	$66.52/MWh	$67.94/MWh	$68.81/MWh	$70.89/MWh	$72.87/MWh	$75.00/MWh
Average Off Peak ($/MWh)	$48.12/MWh	$49.44/MWh	$48.04/MWh	$49.86/MWh	$52.26/MWh	$52.33/MWh	$53.55/MWh	$56.21/MWh	$57.27/MWh	$58.71/MWh	$59.75/MWh	$61.03/MWh	$61.82/MWh	$63.68/MWh	$65.46/MWh	$67.37/MWh
		2.73%	-2.84%	3.81%	4.80%	0.13%	2.35%	4.97%	1.87%	2.51%	1.78%	2.14%	1.28%	3.02%	2.79%	2.93%

[1] Source: Correlation to Henry Hub futures pricing.
[2] Source: SMUD forecast, prior study.

4.0 ELECTRIC LOAD SUMMARY

	January	February	March	April	May	June	July	August	September	October	November	December	Total
	31	28	31	30	31	30	31	31	30	31	30	31	365
Energy Consumption (kWh)	1,806,040	1,654,580	1,938,140	1,874,520	2,046,370	2,063,900	2,224,920	2,237,190	2,192,432	2,064,750	1,873,760	1,772,930	23,749,532
Peak Demand (kW)	3,104	3,148	3,331	3,329	3,430	3,763	3,822	3,845	3,894	3,549	3,328	3,047	3,894
Average Demand (kW)	2,427	2,462	2,605	2,604	2,750	2,867	2,990	3,007	3,045	2,775	2,602	2,383	2,710
Min Demand (kW)	1,751	1,776	1,879	1,878	2,071	1,970	2,159	2,169	2,196	2,002	1,877	1,719	1,719
Load Factor (%)	78.20%	78.20%	78.20%	78.20%	80.18%	76.17%	78.25%	78.20%	78.20%	78.20%	78.20%	78.20%	69.63%
Daytime Load (kW)	3,104	3,148	3,331	3,329	3,430	3,763	3,822	3,845	3,894	3,549	3,328	3,047	3,466
Daytime Energy (kWh)	1,154,715	1,057,877	1,239,175	1,198,499	1,276,086	1,354,729	1,421,617	1,430,376	1,401,760	1,320,125	1,198,013	1,133,546	15,186,516
Nighttime Load (kW)	1,751	1,776	1,879	1,878	2,071	1,970	2,159	2,169	2,196	2,002	1,877	1,719	1,954
Nighttime Energy (kWh)	651,325	596,703	698,965	676,021	770,284	709,171	803,303	806,814	790,672	744,625	675,747	639,384	8,563,016
Total Energy (kWh)	1,806,040	1,654,580	1,938,140	1,874,520	2,046,370	2,063,900	2,224,920	2,237,190	2,192,432	2,064,750	1,873,760	1,772,930	23,749,532

STEAM LOAD SUMMARY	January	February	March	April	May	June	July	August	September	October	November	December	Total
North Site													
North Natural Gas (Therms)	38,086	36,124	37,454	34,796	34,866	30,282	30,596	30,095	28,610	33,131	36,661	38,086	408,787
North Natural Gas (MMBtu)	3,809	3,612	3,745	3,480	3,487	3,028	3,060	3,010	2,861	3,313	3,666	3,809	40,879
Existing Boiler Efficiency (%)	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Steam Production (MMBtu)	3,237	3,071	3,184	2,958	2,964	2,574	2,601	2,558	2,432	2,816	3,116	3,237	34,747
Steam Enthalpy (Btu/lb)	**1,047**	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047
Steam Production (lbs)	3,091,979	2,932,695	3,040,711	2,824,898	2,830,573	2,458,400	2,483,948	2,443,275	2,322,668	2,689,702	2,976,266	3,091,979	33,187,093
South Site													
South Natural Gas (Therms)	88,867	84,289	87,394	81,191	81,354	70,657	71,392	70,223	66,756	77,305	85,541	88,867	953,836
South Natural Gas (MMBtu)	8,887	8,429	8,739	8,119	8,135	7,066	7,139	7,022	6,676	7,731	8,554	8,887	95,384
Existing Boiler Efficiency (%)	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Steam Production (MMBtu)	7,554	7,165	7,428	6,901	6,915	6,006	6,068	5,969	5,674	6,571	7,271	7,554	81,076
Steam Enthalpy (Btu/lb)	**1,147**	1,147	1,147	1,147	1,147	1,147	1,147	1,147	1,147	1,147	1,147	1,147	1,147
Steam Production (lbs)	6,585,618	6,246,359	6,476,422	6,016,762	6,028,849	5,236,156	5,290,572	5,203,942	4,947,059	5,728,807	6,339,162	6,585,618	70,685,326
Total Natural Gas (Therms)	126,953	120,413	124,848	115,987	116,220	100,939	101,988	100,318	95,366	110,436	122,202	126,953	1,362,623
Total Natural Gas (MMBtu)	12,695	12,041	12,485	11,599	11,622	10,094	10,199	10,032	9,537	11,044	12,220	12,695	136,262
Total Steam Demand (MMBtu)	10,791	10,235	10,612	9,859	9,879	8,580	8,669	8,527	8,106	9,387	10,387	10,791	115,823
Total Steam Demand (lbs)	9,677,596	9,179,054	9,517,133	8,841,661	8,859,422	7,694,555	7,774,520	7,647,217	7,269,727	8,418,509	9,315,429	9,677,596	103,872,419

4.1 CHP DISPATCH SUMMARY

	Electrical Dispatch					AMPAC Energy Sales - GS TOU Pricing				Grid Sales - FIT Pricing				Steam Production		
Month	Site Load (kWh)	South Generation (kWh)	North Generation (kWh)	Total Generation (kWh)	Grid Sales (kWh)	Site Load (kWh)	Super Peak (kWh)	On Peak (kWh)	Off Peak (kWh)	Grid Sales (kWh)	Super Peak (kWh)	On Peak (kWh)	Off Peak (kWh)	North Site (lbs)	South Site (lbs)	Total Site (lbs)
1	1,806,040	3,257,976	0	3,257,976	1,451,936	1,806,040	0	962,262	843,778	1,451,936	198,889	472,214	780,833	3,091,979	6,585,618	9,677,596
2	1,654,580	2,211,395	0	2,211,395	968,684	1,242,711	0	661,173	581,538	968,684	132,900	320,323	515,461	1,990,606	4,239,800	6,230,406
3	1,938,140	3,257,976	0	3,257,976	1,319,836	1,938,140	0	1,032,646	905,494	1,319,836	169,757	439,764	710,315	3,040,711	6,476,422	9,517,133
4	1,874,520	3,152,880	0	3,152,880	1,278,360	1,874,520	0	998,749	875,771	1,278,360	163,775	423,896	690,690	2,733,773	5,822,673	8,556,446
5	2,046,370	3,257,976	0	3,257,976	1,211,606	2,046,370	0	1,063,405	982,965	1,211,606	147,991	388,059	675,556	2,830,573	6,028,849	8,859,422
6	2,063,900	3,148,501	0	3,148,501	1,086,571	2,061,930	677,365	451,576	932,989	1,086,571	96,075	346,619	643,877	2,375,792	5,060,210	7,436,002
7	2,224,920	2,526,683	0	2,526,683	802,005	1,724,678	550,303	366,869	807,506	802,005	70,239	256,684	475,083	1,926,395	4,103,038	6,029,433
8	2,237,190	3,257,976	0	3,257,976	1,020,786	2,237,190	715,188	476,792	1,045,210	1,020,786	83,289	313,144	624,353	2,443,275	5,203,942	7,647,217
9	2,192,432	3,152,880	0	3,152,880	960,448	2,192,432	700,880	467,253	1,024,299	960,448	75,695	302,694	582,059	2,247,743	4,787,477	7,035,220
10	2,064,750	3,257,976	0	3,257,976	1,193,226	2,064,750	0	1,100,104	964,646	1,193,226	129,523	376,765	686,938	2,689,702	5,728,807	8,418,509
11	1,873,760	3,152,880	0	3,152,880	1,279,120	1,873,760	0	998,344	875,416	1,279,120	163,985	424,185	690,950	2,880,258	6,134,673	9,014,931
12	1,772,930	3,257,976	0	3,257,976	1,485,046	1,772,930	0	944,621	828,309	1,485,046	215,757	503,061	766,227	3,091,979	6,585,618	9,677,596
Total	23,749,532	36,893,075	0	36,893,075	14,057,624	22,835,451	2,643,736	9,523,795	10,667,921	14,057,624	1,647,875	4,567,408	7,842,342	31,342,785	66,757,126	98,099,910

5.0 MONTHLY ELECTRIC REVENUES

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2012
Electric Generation Capacity													
North CHP Plant Generation Capacity (kW)	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Generation Capacity (kW)	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379
Total Generation Capacity (kW)	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379
Electric Generation Energy													
North CHP Plant Generation (kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Generation (kWh)	3,257,976	2,211,395	3,257,976	3,152,880	3,257,976	3,148,501	2,526,683	3,257,976	3,152,880	3,257,976	3,152,880	3,257,976	36,893,075
Total CHP Plant Generation (kWh)	3,257,976	2,211,395	3,257,976	3,152,880	3,257,976	3,148,501	2,526,683	3,257,976	3,152,880	3,257,976	3,152,880	3,257,976	36,893,075
Total Energy Sales													
AMPAC Energy Sales (kWh)	1,806,040	1,242,711	1,938,140	1,874,520	2,046,370	2,061,930	1,724,678	2,237,190	2,192,432	2,064,750	1,873,760	1,772,930	22,835,451
SMUD Grid Energy Sales (kWh)	1,451,936	968,684	1,319,836	1,278,360	1,211,606	1,086,571	802,005	1,020,786	960,448	1,193,226	1,279,120	1,485,046	14,057,624
Total CHP Plant Generation (kWh)	3,257,976	2,211,395	3,257,976	3,152,880	3,257,976	3,148,501	2,526,683	3,257,976	3,152,880	3,257,976	3,152,880	3,257,976	36,893,075
AMPAC Energy Sales													
Super Peak Energy Sales (kWh)	0	0	0	0	0	677,365	550,303	715,188	700,880	0	0	0	2,643,736
On Peak Energy Sales (kWh)	962,262	661,173	1,032,646	998,749	1,063,405	451,576	366,869	476,792	467,253	1,100,104	998,344	944,621	9,523,795
Off Peak Energy Sales (kWh)	843,778	581,538	905,494	875,771	982,965	932,989	807,506	1,045,210	1,024,299	964,646	875,416	828,309	10,667,921
AMPAC Energy Sales (kWh)	1,806,040	1,242,711	1,938,140	1,874,520	2,046,370	2,061,930	1,724,678	2,237,190	2,192,432	2,064,750	1,873,760	1,772,930	22,835,451
SMUD - GS TOU Rate													
Super Peak Energy Rate ($/kWh)	$ -	$ -	$ -	$ -	$ -	$ 0.1203	$ 0.1203	$ 0.1203	$ 0.1203	$ -	$ -	$ -	$ 0.1203
On Peak Energy Rate ($/kWh)	$ 0.0883	$ 0.0883	$ 0.0883	$ 0.0883	$ 0.0883	$ 0.1057	$ 0.1057	$ 0.1057	$ 0.1057	$ 0.0883	$ 0.0883	$ 0.0883	$ 0.0915
Off Peak Energy Rate ($/kWh)	$ 0.0699	$ 0.0699	$ 0.0699	$ 0.0699	$ 0.0699	$ 0.0863	$ 0.0863	$ 0.0863	$ 0.0863	$ 0.0699	$ 0.0699	$ 0.0699	$ 0.0758
AMPAC Energy Revenues													
Super Peak Energy Revenues ($)	$ -	$ -	$ -	$ -	$ -	$ 81,500	$ 66,200	$ 86,000	$ 84,300	$ -	$ -	$ -	$ 318,000
On Peak Energy Revenues ($)	$ 85,000	$ 58,400	$ 91,200	$ 88,200	$ 93,900	$ 47,700	$ 38,800	$ 50,400	$ 49,400	$ 97,100	$ 88,200	$ 83,400	$ 871,700
Off Peak Energy Revenues ($)	$ 59,000	$ 40,600	$ 63,300	$ 61,200	$ 68,700	$ 80,500	$ 69,700	$ 90,200	$ 88,400	$ 67,400	$ 61,200	$ 57,900	$ 808,100
AMPAC Energy Revenues ($)	$ 144,000	$ 99,000	$ 154,500	$ 149,400	$ 162,600	$ 209,700	$ 174,700	$ 226,600	$ 222,100	$ 164,500	$ 149,400	$ 141,300	$ 1,997,800
SMUD Grid Energy Sales													
Super Peak Energy Sales (kWh)	198,889	132,900	169,757	163,775	147,991	96,075	70,239	83,289	75,695	129,523	163,985	215,757	1,647,875
On Peak Energy Sales (kWh)	472,214	320,323	439,764	423,896	388,059	346,619	256,684	313,144	302,694	376,765	424,185	503,061	4,567,408
Off Peak Energy Sales (kWh)	780,833	515,461	710,315	690,690	675,556	643,877	475,083	624,353	582,059	686,938	690,950	766,227	7,842,342
SMUD Grid Energy Sales (kWh)	1,451,936	968,684	1,319,836	1,278,360	1,211,606	1,086,571	802,005	1,020,786	960,448	1,193,226	1,279,120	1,485,046	14,057,624
SMUD - FIT Rate													
Super Peak Energy Rate ($/kWh)	$ 0.0606	$ 0.0606	$ 0.0505	$ 0.0505	$ 0.0505	$ 0.2235	$ 0.2235	$ 0.2235	$ 0.2235	$ 0.0606	$ 0.0606	$ 0.0606	$ 0.0899
On Peak Energy Rate ($/kWh)	$ 0.0551	$ 0.0551	$ 0.0486	$ 0.0486	$ 0.0486	$ 0.0583	$ 0.0583	$ 0.0583	$ 0.0583	$ 0.0551	$ 0.0551	$ 0.0551	$ 0.0542
Off Peak Energy Rate ($/kWh)	$ 0.0433	$ 0.0433	$ 0.0374	$ 0.0374	$ 0.0374	$ 0.0499	$ 0.0499	$ 0.0499	$ 0.0499	$ 0.0433	$ 0.0433	$ 0.0433	$ 0.0437
SMUD Grid Energy Revenues													
Super Peak Energy Revenues ($)	$ 12,100	$ 8,100	$ 8,600	$ 8,300	$ 7,500	$ 21,500	$ 15,700	$ 18,600	$ 16,900	$ 7,900	$ 9,900	$ 13,100	$ 148,200
On Peak Energy Revenues ($)	$ 26,000	$ 17,600	$ 21,400	$ 20,600	$ 18,900	$ 20,200	$ 15,000	$ 18,200	$ 17,600	$ 20,800	$ 23,400	$ 27,700	$ 247,400
Off Peak Energy Revenues ($)	$ 33,800	$ 22,300	$ 26,600	$ 25,800	$ 25,300	$ 32,100	$ 23,700	$ 31,200	$ 29,100	$ 29,800	$ 29,900	$ 33,200	$ 342,800
SMUD Grid Energy Revenues ($)	$ 71,900	$ 48,000	$ 56,600	$ 54,700	$ 51,700	$ 73,800	$ 54,400	$ 68,000	$ 63,600	$ 58,500	$ 63,200	$ 74,000	$ 738,400
Total CHP Plant Energy Revenues													
AMPAC Energy Revenues ($)	$ 144,000	$ 99,000	$ 154,500	$ 149,400	$ 162,600	$ 209,700	$ 174,700	$ 226,600	$ 222,100	$ 164,500	$ 149,400	$ 141,300	$ 1,997,800
SMUD Grid Energy Revenues ($)	$ 71,900	$ 48,000	$ 56,600	$ 54,700	$ 51,700	$ 73,800	$ 54,400	$ 68,000	$ 63,600	$ 58,500	$ 63,200	$ 74,000	$ 738,400
Total Energy Revenues ($)	$ 215,900	$ 147,000	$ 211,100	$ 204,100	$ 214,300	$ 283,500	$ 229,100	$ 294,600	$ 285,700	$ 223,000	$ 212,600	$ 215,300	$ 2,736,200

5.1 ANNUAL ELECTRIC REVENUES

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
			Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
Electric Generation Capacity																
North CHP Plant Generation Capacity (kW)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Generation Capacity (kW)	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379
Total Generation Capacity (kW)	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379
Electric Generation Energy																
North CHP Plant Generation (kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Generation (kWh)	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075
Total CHP Plant Generation (kWh)	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075
Total Energy Sales																
AMPAC Energy Sales (kWh)	22,835,451	22,835,451	22,835,451	22,835,451	22,835,451	22,835,451	22,835,451	22,835,451	22,835,451	22,835,451	22,835,451	22,835,451	22,835,451	22,835,451	22,835,451	22,835,451
SMUD Grid Energy Sales (kWh)	14,057,624	14,057,624	14,057,624	14,057,624	14,057,624	14,057,624	14,057,624	14,057,624	14,057,624	14,057,624	14,057,624	14,057,624	14,057,624	14,057,624	14,057,624	14,057,624
Total CHP Plant Generation (kWh)	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075
AMPAC Energy Sales																
Super Peak Energy Sales (kWh)	2,643,736	2,643,736	2,643,736	2,643,736	2,643,736	2,643,736	2,643,736	2,643,736	2,643,736	2,643,736	2,643,736	2,643,736	2,643,736	2,643,736	2,643,736	2,643,736
On Peak Energy Sales (kWh)	9,523,795	9,523,795	9,523,795	9,523,795	9,523,795	9,523,795	9,523,795	9,523,795	9,523,795	9,523,795	9,523,795	9,523,795	9,523,795	9,523,795	9,523,795	9,523,795
Off Peak Energy Sales (kWh)	10,667,921	10,667,921	10,667,921	10,667,921	10,667,921	10,667,921	10,667,921	10,667,921	10,667,921	10,667,921	10,667,921	10,667,921	10,667,921	10,667,921	10,667,921	10,667,921
AMPAC Energy Sales (kWh)	22,835,451	22,835,451	22,835,451	22,835,451	22,835,451	22,835,451	22,835,451	22,835,451	22,835,451	22,835,451	22,835,451	22,835,451	22,835,451	22,835,451	22,835,451	22,835,451
SMUD - GS TOU Rate																
Super Peak Energy Rate ($/kWh)	$ 0.1203	$ 0.1236	$ 0.1285	$ 0.1336	$ 0.1390	$ 0.1446	$ 0.1503	$ 0.1564	$ 0.1626	$ 0.1691	$ 0.1759	$ 0.1829	$ 0.1902	$ 0.1978	$ 0.2057	$ 0.2140
On Peak Energy Rate ($/kWh)	$ 0.0915	$ 0.0940	$ 0.0978	$ 0.1017	$ 0.1058	$ 0.1100	$ 0.1144	$ 0.1190	$ 0.1237	$ 0.1287	$ 0.1338	$ 0.1392	$ 0.1447	$ 0.1505	$ 0.1566	$ 0.1628
Off Peak Energy Rate ($/kWh)	$ 0.0758	$ 0.0778	$ 0.0809	$ 0.0842	$ 0.0875	$ 0.0910	$ 0.0947	$ 0.0985	$ 0.1024	$ 0.1065	$ 0.1108	$ 0.1152	$ 0.1198	$ 0.1246	$ 0.1296	$ 0.1348
AMPAC Energy Revenues																
Super Peak Energy Revenues ($)	$ 318,000	$ 326,700	$ 339,700	$ 353,300	$ 367,500	$ 382,200	$ 397,500	$ 413,300	$ 429,900	$ 447,100	$ 465,000	$ 483,600	$ 502,900	$ 523,000	$ 543,900	$ 565,700
On Peak Energy Revenues ($)	$ 871,700	$ 895,500	$ 931,300	$ 968,600	$ 1,007,300	$ 1,047,600	$ 1,089,500	$ 1,133,100	$ 1,178,400	$ 1,225,500	$ 1,274,500	$ 1,325,500	$ 1,378,600	$ 1,433,700	$ 1,491,000	$ 1,550,700
Off Peak Energy Revenues ($)	$ 808,100	$ 830,100	$ 863,300	$ 897,900	$ 933,800	$ 971,100	$ 1,010,000	$ 1,050,400	$ 1,092,400	$ 1,136,100	$ 1,181,500	$ 1,228,800	$ 1,278,000	$ 1,329,100	$ 1,382,200	$ 1,437,500
AMPAC Energy Revenues ($)	$ 1,997,800	$ 2,052,300	$ 2,134,300	$ 2,219,800	$ 2,308,600	$ 2,400,900	$ 2,497,000	$ 2,596,800	$ 2,700,700	$ 2,808,700	$ 2,921,000	$ 3,037,900	$ 3,159,500	$ 3,285,800	$ 3,417,100	$ 3,553,900
SMUD Grid Energy Sales																
Super Peak Energy Sales (kWh)	1,647,875	1,647,875	1,647,875	1,647,875	1,647,875	1,647,875	1,647,875	1,647,875	1,647,875	1,647,875	1,647,875	1,647,875	1,647,875	1,647,875	1,647,875	1,647,875
On Peak Energy Sales (kWh)	4,567,408	4,567,408	4,567,408	4,567,408	4,567,408	4,567,408	4,567,408	4,567,408	4,567,408	4,567,408	4,567,408	4,567,408	4,567,408	4,567,408	4,567,408	4,567,408
Off Peak Energy Sales (kWh)	7,842,342	7,842,342	7,842,342	7,842,342	7,842,342	7,842,342	7,842,342	7,842,342	7,842,342	7,842,342	7,842,342	7,842,342	7,842,342	7,842,342	7,842,342	7,842,342
SMUD Grid Energy Sales (kWh)	14,057,624	14,057,624	14,057,624	14,057,624	14,057,624	14,057,624	14,057,624	14,057,624	14,057,624	14,057,624	14,057,624	14,057,624	14,057,624	14,057,624	14,057,624	14,057,624
SMUD - FIT Rate																
Super Peak Energy Rate ($/kWh)	$ 0.0899	$ 0.0923	$ 0.1011	$ 0.1029	$ 0.1046	$ 0.1064	$ 0.1082	$ 0.1100	$ 0.1119	$ 0.1138	$ 0.1157	$ 0.1177	$ 0.1197	$ 0.1218	$ 0.1238	$ 0.1259
On Peak Energy Rate ($/kWh)	$ 0.0542	$ 0.0554	$ 0.0607	$ 0.0617	$ 0.0628	$ 0.0638	$ 0.0649	$ 0.0660	$ 0.0672	$ 0.0683	$ 0.0695	$ 0.0706	$ 0.0718	$ 0.0731	$ 0.0743	$ 0.0756
Off Peak Energy Rate ($/kWh)	$ 0.0437	$ 0.0448	$ 0.0491	$ 0.0500	$ 0.0508	$ 0.0517	$ 0.0526	$ 0.0534	$ 0.0544	$ 0.0553	$ 0.0562	$ 0.0572	$ 0.0581	$ 0.0591	$ 0.0601	$ 0.0612
SMUD Grid Energy Revenues																
Super Peak Energy Revenues ($)	$ 148,200	$ 152,000	$ 166,700	$ 169,500	$ 172,400	$ 175,300	$ 178,300	$ 181,300	$ 184,400	$ 187,500	$ 190,700	$ 194,000	$ 197,300	$ 200,600	$ 204,000	$ 207,500
On Peak Energy Revenues ($)	$ 247,400	$ 252,900	$ 277,200	$ 282,000	$ 286,700	$ 291,600	$ 296,600	$ 301,600	$ 306,800	$ 312,000	$ 317,300	$ 322,700	$ 328,100	$ 333,700	$ 339,400	$ 345,200
Off Peak Energy Revenues ($)	$ 342,800	$ 351,400	$ 385,200	$ 391,800	$ 398,500	$ 405,200	$ 412,100	$ 419,100	$ 426,300	$ 433,500	$ 440,900	$ 448,400	$ 456,000	$ 463,700	$ 471,600	$ 479,600
SMUD Grid Energy Revenues ($)	$ 738,400	$ 756,300	$ 829,100	$ 843,300	$ 857,600	$ 872,100	$ 887,000	$ 902,000	$ 917,500	$ 933,000	$ 948,900	$ 965,100	$ 981,400	$ 998,000	$ 1,015,000	$ 1,032,300
Total CHP Plant Energy Revenues																
AMPAC Energy Revenues ($)	$ 1,997,800	$ 2,052,300	$ 2,134,300	$ 2,219,800	$ 2,308,600	$ 2,400,900	$ 2,497,000	$ 2,596,800	$ 2,700,700	$ 2,808,700	$ 2,921,000	$ 3,037,900	$ 3,159,500	$ 3,285,800	$ 3,417,100	$ 3,553,900
SMUD Grid Energy Revenues ($)	$ 738,400	$ 756,300	$ 829,100	$ 843,300	$ 857,600	$ 872,100	$ 887,000	$ 902,000	$ 917,500	$ 933,000	$ 948,900	$ 965,100	$ 981,400	$ 998,000	$ 1,015,000	$ 1,032,300
Total Energy Revenues ($)	$ 2,736,200	$ 2,808,600	$ 2,963,400	$ 3,063,100	$ 3,166,200	$ 3,273,000	$ 3,384,000	$ 3,498,800	$ 3,618,200	$ 3,741,700	$ 3,869,900	$ 4,003,000	$ 4,140,900	$ 4,283,800	$ 4,432,100	$ 4,586,200

6.0 MONTHLY STEAM REVENUES

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2010
Steam Generation Capacity													
North CHP Plant Generation Capacity (lbs/hr)	4,156	4,156	4,156	4,156	4,156	4,156	4,156	4,156	4,156	4,156	4,156	4,156	4,156
South CHP Plant Generation Capacity (lbs/hr)	8,852	8,852	8,852	8,852	8,852	8,852	8,852	8,852	8,852	8,852	8,852	8,852	8,852
Total Generation Capacity (lbs/hr)	13,008	13,008	13,008	13,008	13,008	13,008	13,008	13,008	13,008	13,008	13,008	13,008	13,008
Steam Generation													
North CHP Plant Steam Generation (lbs)	3,091,979	1,990,606	3,040,711	2,733,773	2,830,573	2,375,792	1,926,395	2,247,743	2,689,702	2,689,702	2,880,258	3,091,979	31,589,212
South CHP Plant Steam Generation (lbs)	6,585,618	4,239,800	6,476,422	5,822,673	6,028,849	5,060,210	4,103,038	5,203,942	4,787,477	5,728,807	6,134,673	6,585,618	66,757,126
Total CHP Plant Steam Generation (lbs)	9,677,596	6,230,406	9,517,133	8,556,446	8,859,422	7,436,002	6,029,433	7,451,684	7,477,179	8,418,509	9,014,931	9,677,596	98,346,337
North CHP Plant Steam Revenues													
North CHP Plant Steam Generation (lbs)	3,091,979	1,990,606	3,040,711	2,733,773	2,830,573	2,375,792	1,926,395	2,247,743	2,689,702	2,689,702	2,880,258	3,091,979	31,589,212
Steam Enthalpy (Btu/lb)	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047
North CHP Plant Steam Generation (MMBtu)	3,237	2,084	3,184	2,862	2,964	2,487	2,017	2,353	2,816	2,816	3,016	3,237	33,074
Existing Boiler Efficiency (%)	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Natural Gas Fuel Units (MMBtu)	3,809	2,452	3,745	3,367	3,487	2,926	2,373	2,769	3,313	3,313	3,548	3,809	38,910
Natural Gas Unit Fuel Price City Gate ($/MMBtu)	$6.37/MMBtu	$5.73/MMBtu	$5.15/MMBtu	$4.46/MMBtu	$4.52/MMBtu	$4.29/MMBtu	$4.66/MMBtu	$4.44/MMBtu	$3.63/MMBtu	$4.09/MMBtu	$3.96/MMBtu	$4.65/MMBtu	$4.67/MMBtu
North CHP Plant Steam Revenue - Gas Credit ($)	$ 24,300	$ 14,000	$ 19,300	$ 15,000	$ 15,800	$ 12,600	$ 11,100	$ 12,300	$ 12,000	$ 13,600	$ 14,000	$ 17,700	$ 181,700
Natural Gas Fuel Units (MMBtu)	3,809	2,452	3,745	3,367	3,487	2,926	2,373	2,769	3,313	3,313	3,548	3,809	38,910
Transportation G-NR2 Up to 400 MMBtu ($/MMBtu)	$4.02/MMBtu	$4.02/MMBtu	$4.02/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$4.02/MMBtu	$4.02/MMBtu	
Transportation G-NR2 Over 400 MMBtu ($/MMBtu)	$1.57/MMBtu	$1.57/MMBtu	$1.57/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.57/MMBtu	$1.57/MMBtu	
Transportation G-NR2 Average ($/MMBtu)	$1.69/MMBtu	$1.76/MMBtu	$1.69/MMBtu	$1.39/MMBtu	$1.39/MMBtu	$1.41/MMBtu	$1.44/MMBtu	$1.40/MMBtu	$1.42/MMBtu	$1.39/MMBtu	$1.69/MMBtu	$1.69/MMBtu	$1.68/MMBtu
North CHP Plant Steam Revenue - Gas Trans Credit ($)	$ 7,000	$ 4,800	$ 6,900	$ 5,100	$ 5,300	$ 4,600	$ 3,800	$ 4,300	$ 5,000	$ 5,000	$ 6,500	$ 7,000	$ 65,300
North CHP Plant Steam Generation (lbs)	3,091,979	1,990,606	3,040,711	2,733,773	2,830,573	2,375,792	1,926,395	2,247,743	2,689,702	2,689,702	2,880,258	3,091,979	31,589,212
North CHP Plant Steam Revenue ($)	$ 31,300	$ 18,800	$ 26,200	$ 20,100	$ 21,100	$ 17,200	$ 14,900	$ 16,600	$ 17,000	$ 18,600	$ 20,500	$ 24,700	$ 247,000
North CHP Plant Steam Revenue ($/1000 lb)	$ 10.1230	$ 9.4444	$ 8.6164	$ 7.3525	$ 7.4543	$ 7.2397	$ 7.7347	$ 7.3852	$ 6.3204	$ 6.9153	$ 7.1174	$ 7.9884	$ 7.8191
South CHP Plant Steam Revenues													
South CHP Plant Steam Generation (lbs)	6,585,618	4,239,800	6,476,422	5,822,673	6,028,849	5,060,210	4,103,038	5,203,942	4,787,477	5,728,807	6,134,673	6,585,618	66,757,126
Steam Enthalpy (Btu/lb)	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047
South CHP Plant Steam Generation (MMBtu)	6,895	4,439	6,781	6,096	6,312	5,298	4,296	5,449	5,012	5,998	6,423	6,895	69,895
Existing Boiler Efficiency (%)	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Natural Gas Fuel Units (MMBtu)	8,112	5,222	7,977	7,172	7,426	6,233	5,054	6,410	5,897	7,057	7,556	8,112	82,229
Natural Gas Unit Fuel Price City Gate ($/MMBtu)	$6.37/MMBtu	$5.73/MMBtu	$5.15/MMBtu	$4.46/MMBtu	$4.52/MMBtu	$4.29/MMBtu	$4.66/MMBtu	$4.44/MMBtu	$3.63/MMBtu	$4.09/MMBtu	$3.96/MMBtu	$4.65/MMBtu	$4.68/MMBtu
South CHP Plant Steam Revenue - Gas Credit ($)	$ 51,700	$ 29,900	$ 41,100	$ 32,000	$ 33,600	$ 26,700	$ 23,600	$ 28,500	$ 21,400	$ 28,900	$ 29,900	$ 37,700	$ 385,000
Natural Gas Fuel Units (MMBtu)	8,112	5,222	7,977	7,172	7,426	6,233	5,054	6,410	5,897	7,057	7,556	8,112	82,229
Transportation G-NR2 Up to 400 MMBtu ($/MMBtu)	$4.02/MMBtu	$4.02/MMBtu	$4.02/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$4.02/MMBtu	$4.02/MMBtu	
Transportation G-NR2 Over 400 MMBtu ($/MMBtu)	$1.57/MMBtu	$1.57/MMBtu	$1.57/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.57/MMBtu	$1.57/MMBtu	
Transportation G-NR2 Average ($/MMBtu)	$1.69/MMBtu	$1.76/MMBtu	$1.69/MMBtu	$1.39/MMBtu	$1.39/MMBtu	$1.41/MMBtu	$1.44/MMBtu	$1.40/MMBtu	$1.42/MMBtu	$1.39/MMBtu	$1.69/MMBtu	$1.69/MMBtu	$1.54/MMBtu
South CHP Plant Steam Revenue - Gas Trans. Credit ($)	$ 13,700	$ 9,200	$ 13,500	$ 10,000	$ 10,300	$ 8,800	$ 7,300	$ 9,000	$ 8,400	$ 9,800	$ 12,800	$ 13,700	$ 126,500
South CHP Plant Steam Generation (lbs)	6,585,618	4,239,800	6,476,422	5,822,673	6,028,849	5,060,210	4,103,038	5,203,942	4,787,477	5,728,807	6,134,673	6,585,618	66,757,126
South CHP Plant Steam Revenue ($)	$ 65,400	$ 39,100	$ 54,600	$ 42,000	$ 43,900	$ 35,500	$ 30,900	$ 37,500	$ 29,800	$ 38,700	$ 42,700	$ 51,400	$ 511,500
South CHP Plant Steam Revenue ($/1000 lb)	$ 9.9307	$ 9.2221	$ 8.4306	$ 7.2132	$ 7.2817	$ 7.0155	$ 7.5310	$ 7.2061	$ 6.2246	$ 6.7553	$ 6.9604	$ 7.8049	$ 7.6621
Total CHP Plant Steam Revenues													
North CHP Plant Steam Revenue ($)	31,300	18,800	26,200	20,100	21,100	17,200	14,900	16,600	17,000	18,600	20,500	24,700	247,000
South CHP Plant Steam Revenue ($)	$ 65,400	$ 39,100	$ 54,600	$ 42,000	$ 43,900	$ 35,500	$ 30,900	$ 37,500	$ 29,800	$ 38,700	$ 42,700	$ 51,400	$ 511,500
Total CHP Plant Steam Revenue ($)	$ 96,700	$ 57,900	$ 80,800	$ 62,100	$ 65,000	$ 52,700	$ 45,800	$ 54,100	$ 46,800	$ 57,300	$ 63,200	$ 76,100	$ 758,500

6.1 ANNUAL STEAM REVENUES

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
			Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
Steam Generation Capacity																
North CHP Plant Generation Capacity (lbs/hr)	4,156	4,156	4,156	4,156	4,156	4,156	4,156	4,156	4,156	4,156	4,156	4,156	4,156	4,156	4,156	4,156
South CHP Plant Generation Capacity (lbs/hr)	8,852	8,852	8,852	8,852	8,852	8,852	8,852	8,852	8,852	8,852	8,852	8,852	8,852	8,852	8,852	8,852
Total Generation Capacity (lbs/hr)	13,008	13,008	13,008	13,008	13,008	13,008	13,008	13,008	13,008	13,008	13,008	13,008	13,008	13,008	13,008	13,008
Steam Generation																
North CHP Plant Steam Generation (lbs)	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212
South CHP Plant Steam Generation (lbs)	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126
Total CHP Plant Steam Generation (lbs)	98,346,337	98,346,337	98,346,337	98,346,337	98,346,337	98,346,337	98,346,337	98,346,337	98,346,337	98,346,337	98,346,337	98,346,337	98,346,337	98,346,337	98,346,337	98,346,337
North CHP Plant Steam Revenues																
North CHP Plant Steam Generation (lbs)	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212
Steam Enthalpy (Btu/lb)	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047
North CHP Plant Steam Generation (MMBtu)	33,074	33,074	33,074	33,074	33,074	33,074	33,074	33,074	33,074	33,074	33,074	33,074	33,074	33,074	33,074	33,074
Existing Boiler Efficiency (%)	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Natural Gas Fuel Units (MMBtu)	38,910	38,910	38,910	38,910	38,910	38,910	38,910	38,910	38,910	38,910	38,910	38,910	38,910	38,910	38,910	38,910
Natural Gas Unit Fuel Price City Gate ($/MMBtu)	$4.66/MMBtu	$4.29/MMBtu	$3.31/MMBtu	$4.15/MMBtu	$4.55/MMBtu	$4.80/MMBtu	$5.03/MMBtu	$5.26/MMBtu	$5.50/MMBtu	$5.76/MMBtu	$6.01/MMBtu	$6.28/MMBtu	$6.56/MMBtu	$6.86/MMBtu	$7.16/MMBtu	$7.48/MMBtu
North CHP Plant Steam Revenue - Gas Credit ($)	$ 181,700	$ 166,800	$ 128,900	$ 161,500	$ 177,000	$ 186,800	$ 195,700	$ 204,800	$ 214,200	$ 223,900	$ 234,000	$ 244,400	$ 255,400	$ 266,800	$ 278,700	$ 291,200
Natural Gas Fuel Units (MMBtu)	38,910	38,910	38,910	38,910	38,910	38,910	38,910	38,910	38,910	38,910	38,910	38,910	38,910	38,910	38,910	38,910
Transportation G-NR2 Average ($/MMBtu)	$1.54/MMBtu	$1.55/MMBtu	$1.57/MMBtu	$1.58/MMBtu	$1.60/MMBtu	$1.62/MMBtu	$1.63/MMBtu	$1.65/MMBtu	$1.67/MMBtu	$1.68/MMBtu	$1.70/MMBtu	$1.72/MMBtu	$1.73/MMBtu	$1.75/MMBtu	$1.77/MMBtu	$1.79/MMBtu
North CHP Plant Steam Revenue - Gas Trans Credit ($)	$ 65,300	$ 60,500	$ 61,100	$ 61,700	$ 62,300	$ 62,900	$ 63,500	$ 64,200	$ 64,800	$ 65,500	$ 66,100	$ 66,800	$ 67,500	$ 68,100	$ 68,800	$ 69,500
North CHP Plant Steam Generation (lbs)	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212	31,589,212
North CHP Plant Steam Revenue ($)	$ 247,000	$ 227,300	$ 190,000	$ 223,200	$ 239,300	$ 249,700	$ 259,200	$ 269,000	$ 279,000	$ 289,400	$ 300,100	$ 311,200	$ 322,900	$ 334,900	$ 347,500	$ 360,700
North CHP Plant Steam Revenue ($/1000 lb)	$ 7.8191	$ 7.1955	$ 6.0147	$ 7.0657	$ 7.5754	$ 7.9046	$ 8.2053	$ 8.5156	$ 8.8321	$ 9.1614	$ 9.5001	$ 9.8515	$ 10.2218	$ 10.6017	$ 11.0006	$ 11.4185
South CHP Plant Steam Revenues																
South CHP Plant Steam Generation (lbs)	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126
Steam Enthalpy (Btu/lb)	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047
South CHP Plant Steam Generation (MMBtu)	69,895	69,895	69,895	69,895	69,895	69,895	69,895	69,895	69,895	69,895	69,895	69,895	69,895	69,895	69,895	69,895
Existing Boiler Efficiency (%)	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Natural Gas Fuel Units (MMBtu)	82,229	82,229	82,229	82,229	82,229	82,229	82,229	82,229	82,229	82,229	82,229	82,229	82,229	82,229	82,229	82,229
Natural Gas Unit Fuel Price City Gate ($/MMBtu)	$4.66/MMBtu	$4.29/MMBtu	$3.31/MMBtu	$4.15/MMBtu	$4.55/MMBtu	$4.80/MMBtu	$5.03/MMBtu	$5.26/MMBtu	$5.50/MMBtu	$5.76/MMBtu	$6.01/MMBtu	$6.28/MMBtu	$6.56/MMBtu	$6.86/MMBtu	$7.16/MMBtu	$7.48/MMBtu
South CHP Plant Steam Revenue - Gas Credit ($)	$ 385,000	352,600	272,300	341,200	374,100	394,900	413,600	432,800	452,700	473,200	494,400	516,600	539,700	563,800	589,100	615,400
Natural Gas Fuel Units (MMBtu)	82,229	82,229	82,229	82,229	82,229	82,229	82,229	82,229	82,229	82,229	82,229	82,229	82,229	82,229	82,229	82,229
Transportation G-NR2 Average ($/MMBtu)	$1.54/MMBtu	$1.55/MMBtu	$1.57/MMBtu	$1.58/MMBtu	$1.60/MMBtu	$1.62/MMBtu	$1.63/MMBtu	$1.65/MMBtu	$1.67/MMBtu	$1.68/MMBtu	$1.70/MMBtu	$1.72/MMBtu	$1.73/MMBtu	$1.75/MMBtu	$1.77/MMBtu	$1.79/MMBtu
South CHP Plant Steam Revenue - Gas Trans. Credit ($)	$ 126,500	127,800	129,000	130,300	131,600	133,000	134,300	135,600	137,000	138,400	139,700	141,100	142,500	144,000	145,400	146,900
South CHP Plant Steam Generation (lbs)	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126	66,757,126
South CHP Plant Steam Revenue ($)	$ 511,500	$ 480,400	$ 401,300	$ 471,500	$ 505,700	$ 527,900	$ 547,900	$ 568,400	$ 589,700	$ 611,600	$ 634,100	$ 657,700	$ 682,200	$ 707,800	$ 734,500	$ 762,300
South CHP Plant Steam Revenue ($/1000 lb)	$ 7.6621	$ 7.1962	$ 6.0113	$ 7.0629	$ 7.5752	$ 7.9078	$ 8.2074	$ 8.5144	$ 8.8335	$ 9.1616	$ 9.4986	$ 9.8521	$ 10.2191	$ 10.6026	$ 11.0026	$ 11.4190
Total CHP Plant Steam Revenues																
North CHP Plant Steam Revenue ($)	247,000	227,300	190,000	223,200	239,300	249,700	259,200	269,000	279,000	289,400	300,100	311,200	322,900	334,900	347,500	360,700
South CHP Plant Steam Revenue ($)	$ 511,500	$ 480,400	$ 401,300	$ 471,500	$ 505,700	$ 527,900	$ 547,900	$ 568,400	$ 589,700	$ 611,600	$ 634,100	$ 657,700	$ 682,200	$ 707,800	$ 734,500	$ 762,300
Total CHP Plant Steam Revenue ($)	$ 758,500	$ 707,700	$ 591,300	$ 694,700	$ 745,000	$ 777,600	$ 807,100	$ 837,400	$ 868,700	$ 901,000	$ 934,200	$ 968,900	$ 1,005,100	$ 1,042,700	$ 1,082,000	$ 1,123,000

6.0a ANNUAL WASTE DISPOSAL REVENUES

Total CHP Plant Waste Disposal Revenues [1]																
North CHP Plant Waste Disposal Revenue ($)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Waste Disposal Revenue ($)	$ 2,146,000	$ 2,188,900	$ 2,232,700	$ 2,277,400	$ 2,322,900	$ 2,369,400	$ 2,416,800	$ 2,465,100	$ 2,514,400	$ 2,564,700	$ 2,616,000	$ 2,668,300	$ 2,721,700	$ 2,776,100	$ 2,831,600	$ 2,888,200
Total CHP Plant Waste Disposal Revenue ($)	$ 2,146,000	$ 2,188,900	$ 2,232,700	$ 2,277,400	$ 2,322,900	$ 2,369,400	$ 2,416,800	$ 2,465,100	$ 2,514,400	$ 2,564,700	$ 2,616,000	$ 2,668,300	$ 2,721,700	$ 2,776,100	$ 2,831,600	$ 2,888,200

[1] Estimated to be $2,146,000 annually, inflatted at 2.0% per year.

7.0 MONTHLY PRODUCTION COSTS

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2012
Electric Generation Capacity													
North CHP Plant Generation Capacity (kW)	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Generation Capacity (kW)	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379
Total Generation Capacity (kW)	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379
Electric Generation Energy													
North CHP Plant Generation (kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Generation (kWh)	3,257,976	2,211,395	3,257,976	3,152,880	3,257,976	3,148,501	2,526,683	3,257,976	3,152,880	3,257,976	3,152,880	3,257,976	36,893,075
Total CHP Plant Generation (kWh)	3,257,976	2,211,395	3,257,976	3,152,880	3,257,976	3,148,501	2,526,683	3,257,976	3,152,880	3,257,976	3,152,880	3,257,976	36,893,075
North CHP Plant Production Costs													
North CHP Plant Generation Capacity (kW)	0	0	0	0	0	0	0	0	0	0	0	0	0
North CHP Plant Generation (kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0
North CHP Plant Heat Rate HHV (Btu/kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0
North CHP Plant Fuel Use HHV (MMBtu)	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural Gas Unit Fuel Price City Gate ($/MMBtu)	$6.37/MMBtu	$5.73/MMBtu	$5.15/MMBtu	$4.46/MMBtu	$4.52/MMBtu	$4.29/MMBtu	$4.66/MMBtu	$4.44/MMBtu	$3.63/MMBtu	$4.09/MMBtu	$3.96/MMBtu	$4.65/MMBtu	$0.00/MMBtu
North CHP Plant Natural Gas Fuel Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0
North CHP Plant Fuel Use HHV (MMBtu)	0	0	0	0	0	0	0	0	0	0	0	0	0
Transportation G-EG ($/MMBtu)	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.00/MMBtu
North CHP Plant Natural Gas Transportation Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0
Total North CHP Plant Natural Gas Use (MMBtu)	0	0	0	0	0	0	0	0	0	0	0	0	0
Total North CHP Plant Natural Gas Fuel Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total North CHP Plant Natural Gas Fuel Cost ($/MMBtu)													
South CHP Plant Production Costs													
South CHP Plant Generation Capacity (kW)	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379
South CHP Plant Generation (kWh)	3,257,976	2,211,395	3,257,976	3,152,880	3,257,976	3,148,501	2,526,683	3,257,976	3,152,880	3,257,976	3,152,880	3,257,976	36,893,075
South CHP Plant Heat Rate HHV (Btu/kWh)	10,073	10,073	10,073	10,073	10,073	10,073	10,073	10,073	10,073	10,073	10,073	10,073	10,073
GROSS South CHP Plant Fuel Use HHV (MMBtu)	32,818	22,276	32,818	31,759	32,818	31,715	25,451	32,818	31,759	32,818	31,759	32,818	371,627
Maximum Waste to Fuel Natural Gas Offset (MMBtu)	12,648	11,424	12,648	12,240	12,648	12,240	12,648	12,648	12,240	12,648	12,240	12,648	148,920
NET South CHP Plant Fuel Use HHV (MMBtu)	20,170	10,852	20,170	19,519	20,170	19,475	12,803	20,170	19,519	20,170	19,519	20,170	222,707
Natural Gas Unit Fuel Price City Gate ($/MMBtu)	$6.37/MMBtu	$5.73/MMBtu	$5.15/MMBtu	$4.46/MMBtu	$4.52/MMBtu	$4.29/MMBtu	$4.66/MMBtu	$4.44/MMBtu	$3.63/MMBtu	$4.09/MMBtu	$3.96/MMBtu	$4.65/MMBtu	$4.63/MMBtu
South CHP Plant Natural Gas Fuel Cost ($)	$ 128,500	$ 62,200	$ 103,900	$ 87,100	$ 91,200	$ 83,500	$ 59,700	$ 89,600	$ 70,900	$ 82,500	$ 77,300	$ 93,800	1,030,200
South CHP Plant Fuel Use HHV (MMBtu)	20,170	10,852	20,170	19,519	20,170	19,475	12,803	20,170	19,519	20,170	19,519	20,170	222,707
Transportation G-EG ($/MMBtu)	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu
South CHP Plant Natural Gas Transportation Cost ($)	$ 6,300	$ 3,400	$ 6,300	$ 6,100	$ 6,300	$ 6,000	$ 4,000	$ 6,300	$ 6,100	$ 6,300	$ 6,100	$ 6,300	$ 69,500
Total South CHP Plant Natural Gas Use (MMBtu)	20,170	10,852	20,170	19,519	20,170	19,475	12,803	20,170	19,519	20,170	19,519	20,170	222,707
Total South CHP Plant Natural Gas Fuel Cost ($)	$ 134,800	$ 65,600	$ 110,200	$ 93,200	$ 97,500	$ 89,500	$ 63,700	$ 95,900	$ 77,000	$ 88,800	$ 83,400	$ 100,100	$ 1,099,700
Total South CHP Plant Natural Gas Fuel Cost ($/MMBtu)	$6.68/MMBtu	$6.05/MMBtu	$5.46/MMBtu	$4.77/MMBtu	$4.83/MMBtu	$4.60/MMBtu	$4.98/MMBtu	$4.75/MMBtu	$3.94/MMBtu	$4.40/MMBtu	$4.27/MMBtu	$4.96/MMBtu	$4.94/MMBtu
Total CHP Plant Production Costs													
Total Natural Gas Fuel Use (MMBtu)	20,170	10,852	20,170	19,519	20,170	19,475	12,803	20,170	19,519	20,170	19,519	20,170	222,707
Total Natural Gas Fuel Cost ($)	$ 134,800	$ 65,600	$ 110,200	$ 93,200	$ 97,500	$ 89,500	$ 63,700	$ 95,900	$ 77,000	$ 88,800	$ 83,400	$ 100,100	$ 1,099,700
Total Natural Gas Fuel Cost ($/MMBtu)	$6.68/MMBtu	$6.05/MMBtu	$5.46/MMBtu	$4.77/MMBtu	$4.83/MMBtu	$4.60/MMBtu	$4.98/MMBtu	$4.75/MMBtu	$3.94/MMBtu	$4.40/MMBtu	$4.27/MMBtu	$4.96/MMBtu	$4.94/MMBtu

7.1 ANNUAL PRODUCTION COSTS

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
			Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
Electric Generation Capacity																
North CHP Plant Generation Capacity (kW)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Generation Capacity (kW)	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379
Total Generation Capacity (kW)	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379
Electric Generation Energy																
North CHP Plant Generation (kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Generation (kWh)	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075
Total CHP Plant Generation (kWh)	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075
North CHP Plant Production Costs																
North CHP Plant Generation Capacity (kW)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North CHP Plant Generation (kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North CHP Plant Heat Rate HHV (Btu/kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North CHP Plant Fuel Use HHV (MMBtu)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural Gas Unit Fuel Price City Gate ($/MMBtu)	$4.66/MMBtu	$4.29/MMBtu	$3.31/MMBtu	$4.15/MMBtu	$4.55/MMBtu	$4.80/MMBtu	$5.03/MMBtu	$5.26/MMBtu	$5.50/MMBtu	$5.76/MMBtu	$6.01/MMBtu	$6.28/MMBtu	$6.56/MMBtu	$6.86/MMBtu	$7.16/MMBtu	$7.48/MMBtu
North CHP Plant Natural Gas Fuel Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
North CHP Plant Fuel Use HHV (MMBtu)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transportation G-EG ($/MMBtu)	$0.31/MMBtu	$0.32/MMBtu	$0.32/MMBtu	$0.32/MMBtu	$0.32/MMBtu	$0.33/MMBtu	$0.33/MMBtu	$0.33/MMBtu	$0.34/MMBtu	$0.34/MMBtu	$0.34/MMBtu	$0.35/MMBtu	$0.35/MMBtu	$0.36/MMBtu	$0.36/MMBtu	$0.36/MMBtu
North CHP Plant Natural Gas Transportation Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total North CHP Plant Natural Gas Use (MMBtu)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total North CHP Plant Natural Gas Fuel Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total North CHP Plant Natural Gas Fuel Cost ($/MMBtu)																
South CHP Plant Production Costs																
South CHP Plant Generation Capacity (kW)	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379	4,379
South CHP Plant Generation (kWh)	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075	36,893,075
South CHP Plant Heat Rate HHV (Btu/kWh)	10,073	10,073	10,073	10,073	10,073	10,073	10,073	10,073	10,073	10,073	10,073	10,073	10,073	10,073	10,073	10,073
South CHP Plant Fuel Use HHV (MMBtu)	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707
Natural Gas Unit Fuel Price City Gate ($/MMBtu)	$4.63/MMBtu	$4.29/MMBtu	$3.31/MMBtu	$4.15/MMBtu	$4.55/MMBtu	$4.80/MMBtu	$5.03/MMBtu	$5.26/MMBtu	$5.50/MMBtu	$5.76/MMBtu	$6.01/MMBtu	$6.28/MMBtu	$6.56/MMBtu	$6.86/MMBtu	$7.16/MMBtu	$7.48/MMBtu
South CHP Plant Natural Gas Fuel Cost ($)	$ 1,030,200	$ 954,900	$ 737,600	$ 924,200	$ 1,013,300	$ 1,069,400	$ 1,120,100	$ 1,172,300	$ 1,226,000	$ 1,281,700	$ 1,339,100	$ 1,399,000	$ 1,461,600	$ 1,527,000	$ 1,595,400	$ 1,666,800
South CHP Plant Fuel Use HHV (MMBtu)	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707
Transportation G-EG ($/MMBtu)	$0.31/MMBtu	$0.32/MMBtu	$0.32/MMBtu	$0.32/MMBtu	$0.32/MMBtu	$0.33/MMBtu	$0.33/MMBtu	$0.33/MMBtu	$0.34/MMBtu	$0.34/MMBtu	$0.34/MMBtu	$0.35/MMBtu	$0.35/MMBtu	$0.36/MMBtu	$0.36/MMBtu	$0.36/MMBtu
South CHP Plant Natural Gas Transportation Cost ($)	$ 69,500	$ 70,200	$ 70,900	$ 71,600	$ 72,300	$ 73,000	$ 73,800	$ 74,500	$ 75,300	$ 76,000	$ 76,800	$ 77,500	$ 78,300	$ 79,100	$ 79,900	$ 80,700
Total South CHP Plant Natural Gas Use (MMBtu)	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707
Total South CHP Plant Natural Gas Fuel Cost ($)	$ 1,099,700	$ 1,025,100	$ 808,500	$ 995,800	$ 1,085,600	$ 1,142,400	$ 1,193,900	$ 1,246,800	$ 1,301,300	$ 1,357,700	$ 1,415,900	$ 1,476,500	$ 1,539,900	$ 1,606,100	$ 1,675,300	$ 1,747,500
Total South CHP Plant Natural Gas Fuel Cost ($/MMBtu)	$4.94/MMBtu	$4.60/MMBtu	$3.63/MMBtu	$4.47/MMBtu	$4.87/MMBtu	$5.13/MMBtu	$5.36/MMBtu	$5.60/MMBtu	$5.84/MMBtu	$6.10/MMBtu	$6.36/MMBtu	$6.63/MMBtu	$6.91/MMBtu	$7.21/MMBtu	$7.52/MMBtu	$7.85/MMBtu
Total CHP Plant Production Costs																
Total Natural Gas Fuel Use (MMBtu)	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707	222,707
Total Natural Gas Fuel Cost ($)	$ 1,099,700	$ 1,025,100	$ 808,500	$ 995,800	$ 1,085,600	$ 1,142,400	$ 1,193,900	$ 1,246,800	$ 1,301,300	$ 1,357,700	$ 1,415,900	$ 1,476,500	$ 1,539,900	$ 1,606,100	$ 1,675,300	$ 1,747,500
Total Natural Gas Fuel Cost ($/MMBtu)	$4.94/MMBtu	$4.60/MMBtu	$3.63/MMBtu	$4.47/MMBtu	$4.87/MMBtu	$5.13/MMBtu	$5.36/MMBtu	$5.60/MMBtu	$5.84/MMBtu	$6.10/MMBtu	$6.36/MMBtu	$6.63/MMBtu	$6.91/MMBtu	$7.21/MMBtu	$7.52/MMBtu	$7.85/MMBtu

8.0 OPERATION AND MAINTENANCE COSTS

	2012	2013	2014 Year 1	2015 Year 2	2016 Year 3	2017 Year 4	2018 Year 5	2019 Year 6	2020 Year 7	2021 Year 8	2022 Year 9	2023 Year 10	2024 Year 11	2025 Year 12	2026 Year 13	2027 Year 14
Incremental Labor Costs																
Management (Qty)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Burdened Hourly Rate ($/hr)	$ 100.00	$ 102.00	$ 104.04	$ 106.12	$ 108.24	$ 110.41	$ 112.62	$ 114.87	$ 117.17	$ 119.51	$ 121.90	$ 124.34	$ 126.82	$ 129.36	$ 131.95	$ 134.59
Escalation (%)	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Management Labor Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Additional Operators (Qty)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Burdened Hourly Rate ($/hr)	$ 50.00	$ 51.00	$ 52.02	$ 53.06	$ 54.12	$ 55.20	$ 56.31	$ 57.43	$ 58.58	$ 59.75	$ 60.95	$ 62.17	$ 63.41	$ 64.68	$ 65.97	$ 67.29
Escalation (%)	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Operator Labor Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Additional Maintenance Techs (Qty)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Burdened Hourly Rate ($/hr)	$ 50.00	$ 51.00	$ 52.02	$ 53.06	$ 54.12	$ 55.20	$ 56.31	$ 57.43	$ 58.58	$ 59.75	$ 60.95	$ 62.17	$ 63.41	$ 64.68	$ 65.97	$ 67.29
Escalation (%)	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Maintenance Techs Labor Cost ($)	$ 104,000	$ 106,100	$ 108,200	$ 110,400	$ 112,600	$ 114,800	$ 117,100	$ 119,500	$ 121,900	$ 124,300	$ 126,800	$ 129,300	$ 131,900	$ 134,500	$ 137,200	$ 140,000
Total Additional Labor Cost ($)	$ 104,000	$ 106,100	$ 108,200	$ 110,400	$ 112,600	$ 114,800	$ 117,100	$ 119,500	$ 121,900	$ 124,300	$ 126,800	$ 129,300	$ 131,900	$ 134,500	$ 137,200	$ 140,000
North Plant CHP Maintenance Cost																
Number of Units	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Prime Mover Maintenance Cost ($/unit)	$ 430,900	$ 443,800	$ 457,100	$ 470,800	$ 484,900	$ 499,400	$ 514,400	$ 529,800	$ 545,700	$ 562,100	$ 579,000	$ 596,400	$ 614,300	$ 632,700	$ 651,700	$ 671,300
Escalation (%)	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
Total Prime Mover Maintenance Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
South Plant CHP Maintenance Cost																
Number of Units	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Prime Mover Maintenance Cost ($/unit)	$ 430,900	$ 443,800	$ 457,100	$ 470,800	$ 484,900	$ 499,400	$ 514,400	$ 529,800	$ 545,700	$ 562,100	$ 579,000	$ 596,400	$ 614,300	$ 632,700	$ 651,700	$ 671,300
Escalation (%)	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
Total Prime Mover Maintenance Cost ($)	$ 430,900	$ 443,800	$ 457,100	$ 470,800	$ 484,900	$ 499,400	$ 514,400	$ 529,800	$ 545,700	$ 562,100	$ 579,000	$ 596,400	$ 614,300	$ 632,700	$ 651,700	$ 671,300
Total Additional Maintenance Cost ($)	$ 430,900	$ 443,800	$ 457,100	$ 470,800	$ 484,900	$ 499,400	$ 514,400	$ 529,800	$ 545,700	$ 562,100	$ 579,000	$ 596,400	$ 614,300	$ 632,700	$ 651,700	$ 671,300

9.0 FINANCING

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
			Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
Financing Assumptions																
Debt Term (years)	20.00															
Interest Rate	10.00%															
Investment Tax Credit	10%															
Capital Cost	$ 16,488,500															
Less SGIP Incentive	$ (875,000)															
Less Tax Credit	$ (1,648,900)															
Financed Amount	$ 13,964,600															
Debt Financed	100.00%															
Equity Financed	0.00%															
Total Debt Financing	$ 13,964,600															
Total Equity Financing	$ -															
Long Term Financing																
Interest Rate			10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%
Amount to Finance			$ 13,964,600													
Beginning Year Balance			$ 13,964,600	$ 13,720,800	$ 13,452,600	$ 13,157,600	$ 12,833,100	$ 12,476,100	$ 12,083,400	$ 11,651,400	$ 11,176,200	$ 10,653,500	$ 10,078,600	$ 9,446,200	$ 8,750,500	$ 7,985,300
Interest			$ 1,396,500	$ 1,372,100	$ 1,345,300	$ 1,315,800	$ 1,283,300	$ 1,247,600	$ 1,208,300	$ 1,165,100	$ 1,117,600	$ 1,065,400	$ 1,007,900	$ 944,600	$ 875,100	$ 798,500
Principal			$ 243,800	$ 268,200	$ 295,000	$ 324,500	$ 357,000	$ 392,700	$ 432,000	$ 475,200	$ 522,700	$ 574,900	$ 632,400	$ 695,700	$ 765,200	$ 841,800
Annual Debt Payment			$ 1,640,300	$ 1,640,300	$ 1,640,300	$ 1,640,300	$ 1,640,300	$ 1,640,300	$ 1,640,300	$ 1,640,300	$ 1,640,300	$ 1,640,300	$ 1,640,300	$ 1,640,300	$ 1,640,300	$ 1,640,300
End of Year Balance			$ 13,720,800	$ 13,452,600	$ 13,157,600	$ 12,833,100	$ 12,476,100	$ 12,083,400	$ 11,651,400	$ 11,176,200	$ 10,653,500	$ 10,078,600	$ 9,446,200	$ 8,750,500	$ 7,985,300	$ 7,143,500

10.0 DEPRECIATION

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
			Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
Capital Cost	$ 16,488,500															
Less SGIP Incentive	$ (875,000)															
Less Tax Credit	$ (1,648,900)															
Depreciable Basis [1]	$ 15,226,550															
Depreciation Method	MACRS 5-Year															
Depreciation Percentage			20.00%	32.00%	19.20%	11.52%	11.52%	5.76%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Depreciation Expense			$ 3,045,310	$ 4,872,496	$ 2,923,498	$ 1,754,099	$ 1,754,099	$ 877,049	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

[1] Depreciable Basis is equal to total project cost less the tax credits and rebate for which the project qualifies.

11.0 PRO FORMA

	2012	2013	2014 Year 1	2015 Year 2	2016 Year 3	2017 Year 4	2018 Year 5	2019 Year 6	2020 Year 7	2021 Year 8	2022 Year 9	2023 Year 10
INCOME STATEMENT												
Operating Revenues												
Electric Revenues	$ -	$ -	$ 2,963,400	$ 3,063,100	$ 3,166,200	$ 3,273,000	$ 3,384,000	$ 3,498,800	$ 3,618,200	$ 3,741,700	$ 3,869,900	$ 4,003,000
Steam Revenues	$ -	$ -	$ 591,300	$ 694,700	$ 745,000	$ 777,600	$ 807,100	$ 837,400	$ 868,700	$ 901,000	$ 934,200	$ 968,900
Waste Disposal Revenues	$ -	$ -	$ 2,232,700	$ 2,277,400	$ 2,322,900	$ 2,369,400	$ 2,416,800	$ 2,465,100	$ 2,514,400	$ 2,564,700	$ 2,616,000	$ 2,668,300
Total Operating Revenues	$ -	$ -	$ 5,787,400	$ 6,035,200	$ 6,234,100	$ 6,420,000	$ 6,607,900	$ 6,801,300	$ 7,001,300	$ 7,207,400	$ 7,420,100	$ 7,640,200
Operating Expenses												
Natural Gas Expenses	$ -	$ -	$ (808,500)	$ (995,800)	$ (1,085,600)	$ (1,142,400)	$ (1,193,900)	$ (1,246,800)	$ (1,301,300)	$ (1,357,700)	$ (1,415,900)	$ (1,476,500)
Additional Labor Expense	$ -	$ -	$ (108,200)	$ (110,400)	$ (112,600)	$ (114,800)	$ (117,100)	$ (119,500)	$ (121,900)	$ (124,300)	$ (126,800)	$ (129,300)
Additional Maintenance Expense	$ -	$ -	$ (457,100)	$ (470,800)	$ (484,900)	$ (499,400)	$ (514,400)	$ (529,800)	$ (545,700)	$ (562,100)	$ (579,000)	$ (596,400)
Total Operating Expenses			$ (1,373,800)	$ (1,577,000)	$ (1,683,100)	$ (1,756,600)	$ (1,825,400)	$ (1,896,100)	$ (1,968,900)	$ (2,044,100)	$ (2,121,700)	$ (2,202,200)
EBITDA	$ -	$ -	$ 4,413,600	$ 4,458,200	$ 4,551,000	$ 4,663,400	$ 4,782,500	$ 4,905,200	$ 5,032,400	$ 5,163,300	$ 5,298,400	$ 5,438,000
Non-Operating Expenses												
Interest Expense			$ (1,396,500)	$ (1,372,100)	$ (1,345,300)	$ (1,315,800)	$ (1,283,300)	$ (1,247,600)	$ (1,208,300)	$ (1,165,100)	$ (1,117,600)	$ (1,065,400)
Depreciation Expense			$ (3,045,310)	$ (4,872,496)	$ (2,923,498)	$ (1,754,099)	$ (1,754,099)	$ (877,049)	$ -	$ -	$ -	$ -
Total Non-Operating Expenses	$ -	$ -	$ (4,441,810)	$ (6,244,596)	$ (4,268,798)	$ (3,069,899)	$ (3,037,399)	$ (2,124,649)	$ (1,208,300)	$ (1,165,100)	$ (1,117,600)	$ (1,065,400)
EBT	$ -	$ -	$ (28,210)	$ (1,786,396)	$ 282,202	$ 1,593,501	$ 1,745,101	$ 2,780,551	$ 3,824,100	$ 3,998,200	$ 4,180,800	$ 4,372,600
Taxes												
Investment Tax Credit	$ -	$ -	$ 1,648,900	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Federal and State Tax Shield (Tax Liability)	$ -	$ -	$ 11,300	$ 714,600	$ (112,900)	$ (637,400)	$ (698,000)	$ (1,112,200)	$ (1,529,600)	$ (1,599,300)	$ (1,672,300)	$ (1,749,000)
Total Taxes	$ -	$ -	$ 1,660,200	$ 714,600	$ (112,900)	$ (637,400)	$ (698,000)	$ (1,112,200)	$ (1,529,600)	$ (1,599,300)	$ (1,672,300)	$ (1,749,000)
NET INCOME	$ -	$ -	$ 1,631,990	$ (1,071,796)	$ 169,302	$ 956,101	$ 1,047,101	$ 1,668,351	$ 2,294,500	$ 2,398,900	$ 2,508,500	$ 2,623,600
CASH FLOW STATEMENT												
Cash Flows Operating Activities												
Net Income	$ -	$ -	$ 1,631,990	$ (1,071,796)	$ 169,302	$ 956,101	$ 1,047,101	$ 1,668,351	$ 2,294,500	$ 2,398,900	$ 2,508,500	$ 2,623,600
Depreciation Expense	$ -	$ -	$ 3,045,310	$ 4,872,496	$ 2,923,498	$ 1,754,099	$ 1,754,099	$ 877,049	$ -	$ -	$ -	$ -
Net Cash Flows Operating Activities	$ -	$ -	$ 4,677,300	$ 3,800,700	$ 3,092,800	$ 2,710,200	$ 2,801,200	$ 2,545,400	$ 2,294,500	$ 2,398,900	$ 2,508,500	$ 2,623,600
Cash Flows Capital Financing and Investing Activities												
Proceeds From SGIP Rebate		$ 875,000										
Proceeds From Debt		$ 13,964,600										
Capital Acquisition Payments		$ (16,488,500)										
Principal Payments			$ (243,800)	$ (268,200)	$ (295,000)	$ (324,500)	$ (357,000)	$ (392,700)	$ (432,000)	$ (475,200)	$ (522,700)	$ (574,900)
Net Cash Flows Capital Financing and Investing Activities		$ (1,648,900)	$ (243,800)	$ (268,200)	$ (295,000)	$ (324,500)	$ (357,000)	$ (392,700)	$ (432,000)	$ (475,200)	$ (522,700)	$ (574,900)
Net Increase (Decrease) in Cash	$ -	$ (1,648,900)	$ 4,433,500	$ 3,532,500	$ 2,797,800	$ 2,385,700	$ 2,444,200	$ 2,152,700	$ 1,862,500	$ 1,923,700	$ 1,985,800	$ 2,048,700
Cumulative Positive Cash Flows												
Net Present Value		$ 15,511,500										
Discount Rate		**15.00%**										

OPTION 2 – SINGLE CHP PLANT WITH MICROTURBINES

1.0 CHP ASSUMPTIONS

	SELECT CONFIGURATION			Option 1			Option 2			Option 3		
Configuration	**Option 2**											
Project Description	**Single CHP Plant Located at South Site - No Steam Interconnection**			Single CHP Plant Located at South Site - Supplying Steam to North and South Sites			Single CHP Plant Located at South Site - No Steam Interconnection			Single CHP Plant Located at South Site - No Steam Interconnection		
Site	**North Site**	**South Site**	**Total**	North Site	South Site	Total	North Site	South Site	Total	North Site	South Site	Total
Estimated Average Electrical Load (kW)	**0**	**1,500**	**1,500**	1,500	1,500	3,000		1,500	1,500		1,500	1,500
Maximum CHP Electric Generation (kW)	**0**	**5,000**	**5,000**	5,000	5,000	5,000		5,000	5,000		5,000	5,000
Minimum Steam Load (lb/hr)	**0**	**7,000**	**7,000**	5,500	7,000	12,500		7,000	7,000		7,000	7,000
Average Steam Load (lb/hr)	**0**	**15,000**	**15,000**	8,000	15,000	23,000		15,000	15,000		15,000	15,000
Max Steam Load (lb/hr)	**0**	**25,000**	**25,000**	12,000	25,000	37,000		25,000	25,000		25,000	25,000
Power Generation Technology	**0**	**Microturbine**	**Microturbine**		Combustion Turbine	Combustion Turbine		Microturbine	Microturbine		Reciprocating Engine	Reciprocating Engine
Manufacturer	**0**	**Capstone**	**Capstone**		Solar Turbines	Solar Turbines		Capstone	Capstone		GE	GE
Prime Mover	**0**	**C200 x 9**	**C200 x 9**		Mercury 50	Mercury 50		C200 x 9	C200 x 9		Jenbacher JMS 416	Jenbacher JMS 416
Number of Units	**0**	**1**	**1**		1	1		1	1		2	2
Gross Power Generation per Unit (kW)	**0**	**1,800**	**1,800**		4,419	4,419		1,800	1,800		1,137	1,137
Aux Load per Unit (kW)	**0**	**-36**	**-36**		-40	-40		-36	-36		-23	-23
Net Power Generation per Unit (kW)	**0**	**1,764**	**1,764**		4,379	4,379		1,764	1,764		1,114	1,114
Total Power Generation (kW)	**0**	**1,764**	**1,764**		4,379	4,379		1,764	1,764		2,229	2,229
Fuel Input per Unit LHV (MMBtu/hr)	**0.00**	**17.00**	**17.00**		40.10	40.10		17.00	17.00		9.78	9.78
Fuel Input per Unit HHV (MMBtu/hr)	**0.00**	**18.70**	**18.70**		44.11	44.11		18.70	18.70		10.75	10.75
Prime Mover Heat Rate LHV (Btu/kWh)	**0**	**9,637**	**9,637**		9,157	9,157		9,637	9,637		8,774	8,774
Prime Mover Heat Rate HHV (Btu/kWh)	**0**	**10,601**	**10,601**		10,073	10,073		10,601	10,601		9,651	9,651
Total Prime Mover Fuel Input LHV (MMBtu/hr)	**0.0**	**17.0**	**17.0**		40.1	40.1		17.0	17.0		19.6	19.6
Total Prime Mover Fuel Input HHV (MMBtu/hr)	**0.0**	**18.7**	**18.7**		44.1	44.1		18.7	18.7		21.5	21.5
Federal Investment Tax Credit (%)	**0%**	**10%**	**10%**		10%	10%		10%	10%		10%	10%
Steam Generation Technology	**0**	**HRSG**	**HRSG**		HRSG	HRSG		HRSG	HRSG		HRSG	HRSG
Number of Units	**0**	**1**	**1**		1	1		1	1		2	2
Steam Generation per Unit (lb/hr)	**0**	**6,300**	**6,300**		14,376	14,376		6,300	6,300		3,552	3,552
Total Steam Generation (lb/hr)	**0**	**6,300**	**6,300**	0	14,376	14,376		6,300	6,300	0	7,104	7,104
Total Project Capital Cost ($)	**$ -**	**$ 11,972,800**	**$ 11,972,800**	$ -	$ 16,488,500	$ 16,488,500		$ 11,972,800	$ 11,972,800		$ 10,032,100	$ 10,032,100
SGIP Incentive ($)	**$ -**	**$ (691,000)**	**$ (691,000)**	$ -	$ (875,000)	$ (875,000)	$ -	$ (691,000)	$ (691,000)	$ -	$ (529,065)	$ (529,065)
Investment Tax Credit ($)	**$ -**	**$ (1,197,300)**	**$ (1,197,300)**	$ -	$ (1,648,900)	$ (1,648,900)	$ -	$ (1,197,300)	$ (1,197,300)	$ -	$ (1,003,200)	$ (1,003,200)
Net Project Capital Cost ($)	**$ -**	**$ 10,084,500**	**$ 10,084,500**	$ -	$ 13,964,600	$ 13,964,600		$ 10,084,500	$ 10,084,500	$ -	$ 8,499,835	$ 8,499,835
Prime Mover Maintenance Cost ($/unit)	**$ -**	**$ 301,500**	**$ 301,500**		$ 430,900	$ 430,900		$ 301,500	$ 301,500	$ -	$ 137,100	$ 137,100
Number of Units	**0**	**1**	**1**	0	1	1		1	1	0	2	2
Total Prime Mover Maintenance Cost ($)	**$ -**	**$ 301,500**	**$ 301,500**	$ -	$ 430,900	$ 430,900		$ 301,500	$ 301,500	$ -	$ 274,200	$ 274,200
Additional Managers	**0**	**0**	**0**	0	0	0		0	0	0	0	0
Additional Operators	**0**	**0**	**0**	0	0	0		0	0	0	0	0
Additional Maintenance	**0**	**1**	**1**	0	1	1		1	1	0	1	1
Typical Chemical Waste Volume (kg/yr)	**0**	**3,572,000**	**3,572,000**	0	3,572,000	3,572,000	0	3,572,000	3,572,000	0	3,572,000	3,572,000
Anticipated Chemical Waste Volume post Waste-to-Fule Facility (kg/yr)	**0**	**370,628**	**370,628**	0	370,628	370,628	0	370,628	370,628	0	370,628	370,628
Fuel Input provided by WTF Vaporizer (MMBtu/hr)	**0.00**	**17.00**	**17.00**		17.00	17.00		17.00	17.00		17.00	17.00

2.0 GENERAL ASSUMPTIONS

Inflation Rate	2.00%
O&M Escalation Rate	3.00%
Labor Escalation Rate	2.00%
Debt Financed (%)	100.00%
Equity Financed (%)	0.00%
Discount Rate	15.00%
Debt Interest Rate	10.00%
Debt Term (years)	20.00
Marginal Tax Rate	40.00%
Depreciation	MACRS 5-Year
Manager Labor Rate ($/hr)	$ 100.00
Operator Labor Rate ($/hr)	$ 50.00
Maintenance Labor Rate ($/hr)	$ 50.00

2.1 MONTHLY ASSUMPTIONS

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
PG&E Natural Gas Rates												
Natural Gas Unit Fuel Price City Gate ($/MMBtu)	$6.37/MMBtu	$5.73/MMBtu	$5.15/MMBtu	$4.46/MMBtu	$4.52/MMBtu	$4.29/MMBtu	$4.66/MMBtu	$4.44/MMBtu	$3.63/MMBtu	$4.09/MMBtu	$3.96/MMBtu	$4.65/MMBtu
Transportation G-NR2 Up to 400 MMBtu ($/MMBtu)	$4.02/MMBtu	$4.02/MMBtu	$4.02/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$4.02/MMBtu	$4.02/MMBtu
Transportation G-NR2 Over 400 MMBtu ($/MMBtu)	$1.57/MMBtu	$1.57/MMBtu	$1.57/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.57/MMBtu	$1.57/MMBtu
Transporation G-EG ($/MMBtu)	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu
SMUD - GS TOU Rate [1]												
Super Peak Energy Rate ($/kWh)						$0.12030/kWh	$0.12030/kWh	$0.12030/kWh	$0.12030/kWh			
On Peak Energy Rate ($/kWh)	$0.08830/kWh	$0.08830/kWh	$0.08830/kWh	$0.08830/kWh	$0.08830/kWh	$0.10570/kWh	$0.10570/kWh	$0.10570/kWh	$0.10570/kWh	$0.08830/kWh	$0.08830/kWh	$0.08830/kWh
Off Peak Energy Rate ($/kWh)	$0.06990/kWh	$0.06990/kWh	$0.06990/kWh	$0.06990/kWh	$0.06990/kWh	$0.08630/kWh	$0.08630/kWh	$0.08630/kWh	$0.08630/kWh	$0.06990/kWh	$0.06990/kWh	$0.06990/kWh
SMUD - FIT Rate [2]												
Super Peak Energy Rate ($/kWh)	$0.06062/kWh	$0.06062/kWh	$0.05051/kWh	$0.05051/kWh	$0.05051/kWh	$0.22354/kWh	$0.22354/kWh	$0.22354/kWh	$0.22354/kWh	$0.06062/kWh	$0.06062/kWh	$0.06062/kWh
On Peak Energy Rate ($/kWh)	$0.05509/kWh	$0.05509/kWh	$0.04858/kWh	$0.04858/kWh	$0.04858/kWh	$0.05826/kWh	$0.05826/kWh	$0.05826/kWh	$0.05826/kWh	$0.05509/kWh	$0.05509/kWh	$0.05509/kWh
Off Peak Energy Rate ($/kWh)	$0.04334/kWh	$0.04334/kWh	$0.03740/kWh	$0.03740/kWh	$0.03740/kWh	$0.04992/kWh	$0.04992/kWh	$0.04992/kWh	$0.04992/kWh	$0.04334/kWh	$0.04334/kWh	$0.04334/kWh
Steam Enthalphy (Btu/lb)	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047
Existing Boiler Efficiency (%)	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%

2.2 ANNUAL ASSUMPTIONS

	2012	2013	2014 Year 1	2015 Year 2	2016 Year 3	2017 Year 4	2018 Year 5	2019 Year 6	2020 Year 7	2021 Year 8	2022 Year 9	2023 Year 10	2024 Year 11	2025 Year 12	2026 Year 13	2027 Year 14
PG&E Natural Gas Rates																
Natural Gas Unit Fuel Price City Gate ($/MMBtu) [3]	$4.66/MMBtu	$4.29/MMBtu	$3.31/MMBtu	$4.15/MMBtu	$4.55/MMBtu	$4.80/MMBtu	$5.03/MMBtu	$5.26/MMBtu	$5.50/MMBtu	$5.76/MMBtu	$6.01/MMBtu	$6.28/MMBtu	$6.56/MMBtu	$6.86/MMBtu	$7.16/MMBtu	$7.48/MMBtu
Escalation (%)		-8.04%	-22.76%	25.30%	9.64%	5.54%	4.74%	4.66%	4.58%	4.55%	4.48%	4.48%	4.48%	4.48%	4.48%	4.48%
Transportation G-NR2 ($/MMBtu) [4]	$1.56/MMBtu	$1.57/MMBtu	$1.59/MMBtu	$1.61/MMBtu	$1.62/MMBtu	$1.64/MMBtu	$1.65/MMBtu	$1.67/MMBtu	$1.69/MMBtu	$1.70/MMBtu	$1.72/MMBtu	$1.74/MMBtu	$1.76/MMBtu	$1.77/MMBtu	$1.79/MMBtu	$1.81/MMBtu
Transporation G-EG ($/MMBtu) [5]	$0.32/MMBtu	$0.32/MMBtu	$0.33/MMBtu	$0.33/MMBtu	$0.33/MMBtu	$0.34/MMBtu	$0.34/MMBtu	$0.34/MMBtu	$0.35/MMBtu	$0.35/MMBtu	$0.35/MMBtu	$0.36/MMBtu	$0.36/MMBtu	$0.37/MMBtu	$0.37/MMBtu	$0.37/MMBtu
Escalation (%)		1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
SMUD - GS TOU Rate [6]																
Super Peak Energy Rate ($/kWh)	$0.12036/kWh	$0.12365/kWh	$0.12859/kWh	$0.13374/kWh	$0.13908/kWh	$0.14465/kWh	$0.15043/kWh	$0.15645/kWh	$0.16271/kWh	$0.16922/kWh	$0.17599/kWh	$0.18303/kWh	$0.19035/kWh	$0.19796/kWh	$0.20588/kWh	$0.21411/kWh
Escalation (%)		2.73%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%
On Peak Energy Rate ($/kWh)	$0.09115/kWh	$0.09363/kWh	$0.09738/kWh	$0.10127/kWh	$0.10532/kWh	$0.10954/kWh	$0.11392/kWh	$0.11847/kWh	$0.12321/kWh	$0.12814/kWh	$0.13327/kWh	$0.13860/kWh	$0.14414/kWh	$0.14991/kWh	$0.15590/kWh	$0.16214/kWh
Escalation (%)		2.73%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%
Off Peak Energy Rate ($/kWh)	$0.07529/kWh	$0.07734/kWh	$0.08043/kWh	$0.08365/kWh	$0.08700/kWh	$0.09048/kWh	$0.09410/kWh	$0.09786/kWh	$0.10177/kWh	$0.10584/kWh	$0.11008/kWh	$0.11448/kWh	$0.11906/kWh	$0.12382/kWh	$0.12878/kWh	$0.13393/kWh
Escalation (%)		2.73%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%
SMUD - FIT Rate [7]																
Super Peak Energy Rate ($/kWh)	$0.00000/kWh	$0.00000/kWh	$0.00000/kWh	$0.00000/kWh	$0.00000/kWh	$0.00000/kWh	$0.00000/kWh	$0.00000/kWh	$0.00000/kWh	$0.00000/kWh	$0.00000/kWh	$0.00000/kWh	$0.00000/kWh	$0.00000/kWh	$0.00000/kWh	$0.00000/kWh
Escalation (%)		2.58%	9.64%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%
On Peak Energy Rate ($/kWh)	$0.06401/kWh	$0.06542/kWh	$0.07173/kWh	$0.07295/kWh	$0.07419/kWh	$0.07545/kWh	$0.07673/kWh	$0.07803/kWh	$0.07936/kWh	$0.08071/kWh	$0.08208/kWh	$0.08348/kWh	$0.08490/kWh	$0.08634/kWh	$0.08781/kWh	$0.08930/kWh
Escalation (%)		2.21%	9.64%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%
Off Peak Energy Rate ($/kWh)	$0.04529/kWh	$0.04642/kWh	$0.05089/kWh	$0.05176/kWh	$0.05264/kWh	$0.05353/kWh	$0.05444/kWh	$0.05537/kWh	$0.05631/kWh	$0.05727/kWh	$0.05824/kWh	$0.05923/kWh	$0.06024/kWh	$0.06126/kWh	$0.06230/kWh	$0.06336/kWh
Escalation (%)		2.50%	9.64%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%
Steam Enthalph (Btu/lb)	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047
Existing Boiler Efficiency (%)	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%

[1] SMUD GS TOU GUT_L rates are based on Jan 1, 2012 rates.
[2] SMUD FIT Rates are based on rates approved for 2012 & 2013 as effective 1/1/2011.
[3] Based on historical correlation, City Gate natural gas price is estimated to be 8 percent higher than the Henry Hub monthly gas futures on Feb 22, 2012.
[4] Natural Gas Transportation G-NR2 rate is assumed for the existing boilers gas purchases.
[5] Natural Gas Transportation G-EG rate is assumed for the CHP gas purchases.
[6] SMUD - GS TOU rate escalation for 2013 is based on SMUD longterm forecast. Future prices are estimated to be 4 percent higher annually.
[7] SMUD - FIT rate for 2013 is based on average increases in SMUD FIT tariffs. Escalation beyond 2013 is based on FIT contract escalation rate of 1.70%.

3.0 MARKET ASSUMPTIONS

	2012	2013	2014 Year 1	2015 Year 2	2016 Year 3	2017 Year 4	2018 Year 5	2019 Year 6	2020 Year 7	2021 Year 8	2022 Year 9	2023 Year 10	2024 Year 11	2025 Year 12	2026 Year 13	2027 Year 14
Gas Price $/MMBtu [1]																
January	$6.37/MMBtu	$4.26/MMBtu	$3.52/MMBtu	$4.05/MMBtu	$4.63/MMBtu	$4.94/MMBtu	$5.17/MMBtu	$5.41/MMBtu	$5.67/MMBtu	$5.93/MMBtu	$6.20/MMBtu	$6.48/MMBtu	$6.77/MMBtu	$7.07/MMBtu	$7.39/MMBtu	$7.72/MMBtu
February	$5.73/MMBtu	$4.34/MMBtu	$3.19/MMBtu	$4.06/MMBtu	$4.62/MMBtu	$4.91/MMBtu	$5.14/MMBtu	$5.38/MMBtu	$5.64/MMBtu	$5.90/MMBtu	$6.17/MMBtu	$6.44/MMBtu	$6.73/MMBtu	$7.03/MMBtu	$7.35/MMBtu	$7.68/MMBtu
March	$5.15/MMBtu	$4.08/MMBtu	$2.85/MMBtu	$4.05/MMBtu	$4.56/MMBtu	$4.83/MMBtu	$5.06/MMBtu	$5.30/MMBtu	$5.55/MMBtu	$5.82/MMBtu	$6.08/MMBtu	$6.36/MMBtu	$6.64/MMBtu	$6.94/MMBtu	$7.25/MMBtu	$7.57/MMBtu
April	$4.46/MMBtu	$4.53/MMBtu	$3.00/MMBtu	$4.01/MMBtu	$4.41/MMBtu	$4.66/MMBtu	$4.87/MMBtu	$5.10/MMBtu	$5.33/MMBtu	$5.57/MMBtu	$5.81/MMBtu	$6.07/MMBtu	$6.34/MMBtu	$6.63/MMBtu	$6.93/MMBtu	$7.24/MMBtu
May	$4.52/MMBtu	$4.47/MMBtu	$3.11/MMBtu	$4.05/MMBtu	$4.42/MMBtu	$4.67/MMBtu	$4.88/MMBtu	$5.11/MMBtu	$5.34/MMBtu	$5.58/MMBtu	$5.82/MMBtu	$6.08/MMBtu	$6.36/MMBtu	$6.64/MMBtu	$6.94/MMBtu	$7.25/MMBtu
June	$4.29/MMBtu	$4.56/MMBtu	$3.21/MMBtu	$4.10/MMBtu	$4.45/MMBtu	$4.69/MMBtu	$4.91/MMBtu	$5.14/MMBtu	$5.36/MMBtu	$5.61/MMBtu	$5.85/MMBtu	$6.11/MMBtu	$6.39/MMBtu	$6.67/MMBtu	$6.97/MMBtu	$7.28/MMBtu
July	$4.66/MMBtu	$4.60/MMBtu	$3.29/MMBtu	$4.14/MMBtu	$4.49/MMBtu	$4.73/MMBtu	$4.95/MMBtu	$5.17/MMBtu	$5.40/MMBtu	$5.64/MMBtu	$5.89/MMBtu	$6.15/MMBtu	$6.43/MMBtu	$6.71/MMBtu	$7.02/MMBtu	$7.33/MMBtu
August	$4.44/MMBtu	$4.54/MMBtu	$3.33/MMBtu	$4.16/MMBtu	$4.51/MMBtu	$4.74/MMBtu	$4.97/MMBtu	$5.20/MMBtu	$5.43/MMBtu	$5.67/MMBtu	$5.92/MMBtu	$6.19/MMBtu	$6.47/MMBtu	$6.75/MMBtu	$7.06/MMBtu	$7.37/MMBtu
September	$3.63/MMBtu	$4.19/MMBtu	$3.34/MMBtu	$4.16/MMBtu	$4.51/MMBtu	$4.74/MMBtu	$4.97/MMBtu	$5.21/MMBtu	$5.44/MMBtu	$5.68/MMBtu	$5.94/MMBtu	$6.20/MMBtu	$6.48/MMBtu	$6.77/MMBtu	$7.07/MMBtu	$7.39/MMBtu
October	$4.09/MMBtu	$4.15/MMBtu	$3.40/MMBtu	$4.20/MMBtu	$4.55/MMBtu	$4.78/MMBtu	$5.01/MMBtu	$5.24/MMBtu	$5.49/MMBtu	$5.73/MMBtu	$6.00/MMBtu	$6.26/MMBtu	$6.54/MMBtu	$6.84/MMBtu	$7.14/MMBtu	$7.46/MMBtu
November	$3.96/MMBtu	$3.87/MMBtu	$3.59/MMBtu	$4.30/MMBtu	$4.63/MMBtu	$4.87/MMBtu	$5.10/MMBtu	$5.35/MMBtu	$5.60/MMBtu	$5.85/MMBtu	$6.12/MMBtu	$6.40/MMBtu	$6.68/MMBtu	$6.98/MMBtu	$7.29/MMBtu	$7.62/MMBtu
December	$4.65/MMBtu	$3.86/MMBtu	$3.90/MMBtu	$4.52/MMBtu	$4.83/MMBtu	$5.07/MMBtu	$5.31/MMBtu	$5.56/MMBtu	$5.82/MMBtu	$6.08/MMBtu	$6.35/MMBtu	$6.64/MMBtu	$6.93/MMBtu	$7.24/MMBtu	$7.57/MMBtu	$7.91/MMBtu
Average	$4.66/MMBtu	$4.29/MMBtu	$3.31/MMBtu	$4.15/MMBtu	$4.55/MMBtu	$4.80/MMBtu	$5.03/MMBtu	$5.26/MMBtu	$5.50/MMBtu	$5.76/MMBtu	$6.01/MMBtu	$6.28/MMBtu	$6.56/MMBtu	$6.86/MMBtu	$7.16/MMBtu	$7.48/MMBtu
		-8.04%	-22.76%	25.30%	9.64%	5.54%	4.74%	4.66%	4.58%	4.55%	4.48%	4.48%	4.48%	4.48%	4.48%	4.48%
On Peak Energy ($/MWh) [2]																
January	$66.91/MWh	$68.73/MWh	$68.65/MWh	$70.00/MWh	$73.36/MWh	$73.45/MWh	$75.18/MWh	$78.91/MWh	$80.39/MWh	$82.41/MWh	$83.88/MWh	$85.68/MWh	$86.77/MWh	$89.39/MWh	$91.89/MWh	$94.58/MWh
February	$65.84/MWh	$67.60/MWh	$64.98/MWh	$66.25/MWh	$69.43/MWh	$69.52/MWh	$71.16/MWh	$74.69/MWh	$76.09/MWh	$78.00/MWh	$79.39/MWh	$81.09/MWh	$82.13/MWh	$84.61/MWh	$86.97/MWh	$89.52/MWh
March	$64.20/MWh	$65.86/MWh	$62.39/MWh	$63.78/MWh	$66.85/MWh	$66.93/MWh	$68.50/MWh	$71.91/MWh	$73.25/MWh	$75.09/MWh	$76.43/MWh	$78.07/MWh	$79.07/MWh	$81.46/MWh	$83.73/MWh	$86.18/MWh
April	$56.60/MWh	$57.87/MWh	$55.16/MWh	$56.94/MWh	$59.67/MWh	$59.75/MWh	$61.15/MWh	$64.19/MWh	$65.39/MWh	$67.03/MWh	$68.23/MWh	$69.69/MWh	$70.58/MWh	$72.72/MWh	$74.74/MWh	$76.93/MWh
May	$57.86/MWh	$59.19/MWh	$54.87/MWh	$56.73/MWh	$59.46/MWh	$59.54/MWh	$60.93/MWh	$63.96/MWh	$65.16/MWh	$66.80/MWh	$67.99/MWh	$69.44/MWh	$70.33/MWh	$72.46/MWh	$74.48/MWh	$76.66/MWh
June	$60.83/MWh	$62.31/MWh	$58.99/MWh	$60.99/MWh	$63.91/MWh	$64.00/MWh	$65.50/MWh	$68.75/MWh	$70.04/MWh	$71.80/MWh	$73.08/MWh	$74.65/MWh	$75.60/MWh	$77.89/MWh	$80.06/MWh	$82.40/MWh
July	$76.24/MWh	$78.67/MWh	$70.73/MWh	$73.42/MWh	$76.94/MWh	$77.04/MWh	$78.85/MWh	$82.77/MWh	$84.32/MWh	$86.44/MWh	$87.98/MWh	$89.86/MWh	$91.02/MWh	$93.77/MWh	$96.38/MWh	$99.20/MWh
August	$76.29/MWh	$78.73/MWh	$72.01/MWh	$74.82/MWh	$78.42/MWh	$78.52/MWh	$80.36/MWh	$84.35/MWh	$85.94/MWh	$88.09/MWh	$89.66/MWh	$91.59/MWh	$92.76/MWh	$95.56/MWh	$98.22/MWh	$101.10/MWh
September	$69.87/MWh	$71.87/MWh	$67.10/MWh	$70.28/MWh	$73.66/MWh	$73.75/MWh	$75.48/MWh	$79.24/MWh	$80.72/MWh	$82.75/MWh	$84.22/MWh	$86.03/MWh	$87.13/MWh	$89.76/MWh	$92.26/MWh	$94.97/MWh
October	$66.81/MWh	$68.63/MWh	$64.14/MWh	$67.37/MWh	$70.61/MWh	$70.70/MWh	$72.36/MWh	$75.95/MWh	$77.38/MWh	$79.32/MWh	$80.73/MWh	$82.46/MWh	$83.52/MWh	$86.04/MWh	$88.44/MWh	$91.03/MWh
November	$67.34/MWh	$69.19/MWh	$65.26/MWh	$69.17/MWh	$72.49/MWh	$72.59/MWh	$74.29/MWh	$77.98/MWh	$79.45/MWh	$81.44/MWh	$82.89/MWh	$84.67/MWh	$85.75/MWh	$88.34/MWh	$90.81/MWh	$93.47/MWh
December	$68.45/MWh	$70.36/MWh	$67.19/MWh	$71.12/MWh	$74.53/MWh	$74.63/MWh	$76.38/MWh	$80.17/MWh	$81.68/MWh	$83.73/MWh	$85.22/MWh	$87.05/MWh	$88.16/MWh	$90.82/MWh	$93.36/MWh	$96.09/MWh
Average On Peak ($/MWh)	$66.44/MWh	$68.25/MWh	$64.29/MWh	$66.74/MWh	$69.94/MWh	$70.04/MWh	$71.68/MWh	$75.24/MWh	$76.65/MWh	$78.58/MWh	$79.98/MWh	$81.69/MWh	$82.74/MWh	$85.24/MWh	$87.61/MWh	$90.18/MWh
		2.73%	-5.81%	3.81%	4.80%	0.13%	2.35%	4.97%	1.87%	2.51%	1.78%	2.14%	1.28%	3.02%	2.79%	2.93%
Off Peak Energy ($/MWh) [2]																
January	$52.07/MWh	$53.62/MWh	$52.67/MWh	$53.71/MWh	$56.29/MWh	$56.36/MWh	$57.68/MWh	$60.55/MWh	$61.68/MWh	$63.23/MWh	$64.36/MWh	$65.74/MWh	$66.58/MWh	$68.59/MWh	$70.50/MWh	$72.57/MWh
February	$51.80/MWh	$53.33/MWh	$51.94/MWh	$52.96/MWh	$55.50/MWh	$55.57/MWh	$56.88/MWh	$59.70/MWh	$60.82/MWh	$62.35/MWh	$63.46/MWh	$64.82/MWh	$65.65/MWh	$67.64/MWh	$69.52/MWh	$71.56/MWh
March	$49.99/MWh	$51.40/MWh	$49.74/MWh	$50.85/MWh	$53.29/MWh	$53.36/MWh	$54.61/MWh	$57.33/MWh	$58.40/MWh	$59.87/MWh	$60.94/MWh	$62.24/MWh	$63.04/MWh	$64.94/MWh	$66.75/MWh	$68.71/MWh
April	$42.21/MWh	$43.18/MWh	$43.01/MWh	$44.39/MWh	$46.52/MWh	$46.58/MWh	$47.67/MWh	$50.04/MWh	$50.98/MWh	$52.26/MWh	$53.19/MWh	$54.33/MWh	$55.03/MWh	$56.69/MWh	$58.27/MWh	$59.97/MWh
May	$40.05/MWh	$40.91/MWh	$39.52/MWh	$40.87/MWh	$42.83/MWh	$42.89/MWh	$43.89/MWh	$46.07/MWh	$46.94/MWh	$48.12/MWh	$48.97/MWh	$50.02/MWh	$50.66/MWh	$52.19/MWh	$53.65/MWh	$55.22/MWh
June	$39.74/MWh	$40.59/MWh	$39.79/MWh	$41.14/MWh	$43.11/MWh	$43.17/MWh	$44.18/MWh	$46.38/MWh	$47.25/MWh	$48.43/MWh	$49.30/MWh	$50.35/MWh	$51.00/MWh	$52.54/MWh	$54.00/MWh	$55.59/MWh
July	$46.15/MWh	$47.33/MWh	$48.72/MWh	$50.58/MWh	$53.01/MWh	$53.08/MWh	$54.32/MWh	$57.02/MWh	$58.09/MWh	$59.55/MWh	$60.61/MWh	$61.91/MWh	$62.70/MWh	$64.59/MWh	$66.39/MWh	$68.34/MWh
August	$51.42/MWh	$52.92/MWh	$50.32/MWh	$52.28/MWh	$54.79/MWh	$54.86/MWh	$56.15/MWh	$58.94/MWh	$60.05/MWh	$61.56/MWh	$62.65/MWh	$63.99/MWh	$64.82/MWh	$66.77/MWh	$68.63/MWh	$70.64/MWh
September	$50.45/MWh	$51.89/MWh	$49.82/MWh	$52.19/MWh	$54.69/MWh	$54.76/MWh	$56.05/MWh	$58.83/MWh	$59.93/MWh	$61.44/MWh	$62.53/MWh	$63.87/MWh	$64.69/MWh	$66.65/MWh	$68.50/MWh	$70.51/MWh
October	$50.36/MWh	$51.79/MWh	$48.64/MWh	$51.09/MWh	$53.55/MWh	$53.62/MWh	$54.87/MWh	$57.60/MWh	$58.68/MWh	$60.15/MWh	$61.22/MWh	$62.54/MWh	$63.34/MWh	$65.25/MWh	$67.07/MWh	$69.03/MWh
November	$50.92/MWh	$52.39/MWh	$49.81/MWh	$52.80/MWh	$55.33/MWh	$55.41/MWh	$56.71/MWh	$59.52/MWh	$60.64/MWh	$62.16/MWh	$63.27/MWh	$64.63/MWh	$65.46/MWh	$67.43/MWh	$69.31/MWh	$71.34/MWh
December	$52.33/MWh	$53.90/MWh	$52.45/MWh	$55.51/MWh	$58.17/MWh	$58.25/MWh	$59.62/MWh	$62.58/MWh	$63.75/MWh	$65.35/MWh	$66.52/MWh	$67.94/MWh	$68.81/MWh	$70.89/MWh	$72.87/MWh	$75.00/MWh
Average Off Peak ($/MWh)	$48.12/MWh	$49.44/MWh	$48.04/MWh	$49.86/MWh	$52.26/MWh	$52.33/MWh	$53.55/MWh	$56.21/MWh	$57.27/MWh	$58.71/MWh	$59.75/MWh	$61.03/MWh	$61.82/MWh	$63.68/MWh	$65.46/MWh	$67.37/MWh
		2.73%	-2.84%	3.81%	4.80%	0.13%	2.35%	4.97%	1.87%	2.51%	1.78%	2.14%	1.28%	3.02%	2.79%	2.93%

[1] Source: Correlation to Henry Hub futures pricing.
[2] Source: SMUD forecast, prior study.

4.0 ELECTRIC LOAD SUMMARY

	January	February	March	April	May	June	July	August	September	October	November	December	Total
	31	28	31	30	31	30	31	31	30	31	30	31	365
Energy Consumption (kWh)	1,806,040	1,654,580	1,938,140	1,874,520	2,046,370	2,063,900	2,224,920	2,237,190	2,192,432	2,064,750	1,873,760	1,772,930	23,749,532
Peak Demand (kW)	3,104	3,148	3,331	3,329	3,430	3,763	3,822	3,845	3,894	3,549	3,328	3,047	3,894
Average Demand (kW)	2,427	2,462	2,605	2,604	2,750	2,867	2,990	3,007	3,045	2,775	2,602	2,383	2,710
Min Demand (kW)	1,751	1,776	1,879	1,878	2,071	1,970	2,159	2,169	2,196	2,002	1,877	1,719	1,719
Load Factor (%)	78.20%	78.20%	78.20%	78.20%	80.18%	76.17%	78.25%	78.20%	78.20%	78.20%	78.20%	78.20%	69.63%
Daytime Load (kW)	3,104	3,148	3,331	3,329	3,430	3,763	3,822	3,845	3,894	3,549	3,328	3,047	3,466
Daytime Energy (kWh)	1,154,715	1,057,877	1,239,175	1,198,499	1,276,086	1,354,729	1,421,617	1,430,376	1,401,760	1,320,125	1,198,013	1,133,546	15,186,516
Nighttime Load (kW)	1,751	1,776	1,879	1,878	2,071	1,970	2,159	2,169	2,196	2,002	1,877	1,719	1,954
Nighttime Energy (kWh)	651,325	596,703	698,965	676,021	770,284	709,171	803,303	806,814	790,672	744,625	675,747	639,384	8,563,016
Total Energy (kWh)	1,806,040	1,654,580	1,938,140	1,874,520	2,046,370	2,063,900	2,224,920	2,237,190	2,192,432	2,064,750	1,873,760	1,772,930	23,749,532

STEAM LOAD SUMMARY	January	February	March	April	May	June	July	August	September	October	November	December	Total
North Site													
North Natural Gas (Therms)	38,086	36,124	37,454	34,796	34,866	30,282	30,596	30,095	28,610	33,131	36,661	38,086	408,787
North Natural Gas (MMBtu)	3,809	3,612	3,745	3,480	3,487	3,028	3,060	3,010	2,861	3,313	3,666	3,809	40,879
Existing Boiler Efficiency (%)	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Steam Production (MMBtu)	3,237	3,071	3,184	2,958	2,964	2,574	2,601	2,558	2,432	2,816	3,116	3,237	34,747
Steam Enthalpy (Btu/lb)	**1,047**	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047
Steam Production (lbs)	3,091,979	2,932,695	3,040,711	2,824,898	2,830,573	2,458,400	2,483,948	2,443,275	2,322,668	2,689,702	2,976,266	3,091,979	33,187,093
South Site													
South Natural Gas (Therms)	88,867	84,289	87,394	81,191	81,354	70,657	71,392	70,223	66,756	77,305	85,541	88,867	953,836
South Natural Gas (MMBtu)	8,887	8,429	8,739	8,119	8,135	7,066	7,139	7,022	6,676	7,731	8,554	8,887	95,384
Existing Boiler Efficiency (%)	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Steam Production (MMBtu)	7,554	7,165	7,428	6,901	6,915	6,006	6,068	5,969	5,674	6,571	7,271	7,554	81,076
Steam Enthalpy (Btu/lb)	**1,147**	1,147	1,147	1,147	1,147	1,147	1,147	1,147	1,147	1,147	1,147	1,147	1,147
Steam Production (lbs)	6,585,618	6,246,359	6,476,422	6,016,762	6,028,849	5,236,156	5,290,572	5,203,942	4,947,059	5,728,807	6,339,162	6,585,618	70,685,326
Total Natural Gas (Therms)	126,953	120,413	124,848	115,987	116,220	100,939	101,988	100,318	95,366	110,436	122,202	126,953	1,362,623
Total Natural Gas (MMBtu)	12,695	12,041	12,485	11,599	11,622	10,094	10,199	10,032	9,537	11,044	12,220	12,695	136,262
Total Steam Demand (MMBtu)	10,791	10,235	10,612	9,859	9,879	8,580	8,669	8,527	8,106	9,387	10,387	10,791	115,823
Total Steam Demand (lbs)	9,677,596	9,179,054	9,517,133	8,841,661	8,859,422	7,694,555	7,774,520	7,647,217	7,269,727	8,418,509	9,315,429	9,677,596	103,872,419

4.1 CHP DISPATCH SUMMARY

	Electrical Dispatch					AMPAC Energy Sales - GS TOU Pricing				Grid Sales - FIT Pricing				Steam Production		
Month	Site Load (kWh)	South Generation (kWh)	North Generation (kWh)	Total Generation (kWh)	Grid Sales (kWh)	Site Load (kWh)	Super Peak (kWh)	On Peak (kWh)	Off Peak (kWh)	Grid Sales (kWh)	Super Peak (kWh)	On Peak (kWh)	Off Peak (kWh)	North Site (lbs)	South Site (lbs)	Total Site (lbs)
1	1,806,040	1,312,416	0	1,312,416	4,883	1,307,533	0	546,840	760,693	4,883	0	1,365	3,518	0	4,687,200	4,687,200
2	1,654,580	890,820	0	890,820	0	890,820	0	370,440	520,380	0	0	0	0	0	3,181,500	3,181,500
3	1,938,140	1,312,416	0	1,312,416	0	1,312,416	0	546,840	765,576	0	0	0	0	0	4,687,200	4,687,200
4	1,874,520	1,270,080	0	1,270,080	0	1,270,080	0	529,200	740,880	0	0	0	0	0	4,536,000	4,536,000
5	2,046,370	1,312,416	0	1,312,416	0	1,312,416	0	546,840	765,576	0	0	0	0	0	4,687,200	4,687,200
6	2,063,900	1,268,316	0	1,268,316	0	1,268,316	317,520	211,680	739,116	0	0	0	0	0	4,529,700	4,529,700
7	2,224,920	1,017,828	0	1,017,828	0	1,017,828	254,016	169,344	594,468	0	0	0	0	0	3,635,100	3,635,100
8	2,237,190	1,312,416	0	1,312,416	0	1,312,416	328,104	218,736	765,576	0	0	0	0	0	4,687,200	4,687,200
9	2,192,432	1,270,080	0	1,270,080	0	1,270,080	317,520	211,680	740,880	0	0	0	0	0	4,536,000	4,536,000
10	2,064,750	1,312,416	0	1,312,416	0	1,312,416	0	546,840	765,576	0	0	0	0	0	4,687,200	4,687,200
11	1,873,760	1,270,080	0	1,270,080	0	1,270,080	0	529,200	740,880	0	0	0	0	0	4,536,000	4,536,000
12	1,772,930	1,312,416	0	1,312,416	16,824	1,295,592	0	546,840	748,752	16,824	0	4,884	11,939	0	4,687,200	4,687,200
Total	23,749,532	14,861,700	0	14,861,700	21,707	14,839,993	1,217,160	4,974,480	8,648,353	21,707	0	6,249	15,457	0	53,077,500	53,077,500

5.0 MONTHLY ELECTRIC REVENUES

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2012
Electric Generation Capacity													
North CHP Plant Generation Capacity (kW)	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Generation Capacity (kW)	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764
Total Generation Capacity (kW)	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764
Electric Generation Energy													
North CHP Plant Generation (kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Generation (kWh)	1,312,416	890,820	1,312,416	1,270,080	1,312,416	1,268,316	1,017,828	1,312,416	1,270,080	1,312,416	1,270,080	1,312,416	14,861,700
Total CHP Plant Generation (kWh)	1,312,416	890,820	1,312,416	1,270,080	1,312,416	1,268,316	1,017,828	1,312,416	1,270,080	1,312,416	1,270,080	1,312,416	14,861,700
Total Energy Sales													
AMPAC Energy Sales (kWh)	1,307,533	890,820	1,312,416	1,270,080	1,312,416	1,268,316	1,017,828	1,312,416	1,270,080	1,312,416	1,270,080	1,295,592	14,839,993
SMUD Grid Energy Sales (kWh)	4,883	0	0	0	0	0	0	0	0	0	0	16,824	21,707
Total CHP Plant Generation (kWh)	1,312,416	890,820	1,312,416	1,270,080	1,312,416	1,268,316	1,017,828	1,312,416	1,270,080	1,312,416	1,270,080	1,312,416	14,861,700
AMPAC Energy Sales													
Super Peak Energy Sales (kWh)	0	0	0	0	0	317,520	254,016	328,104	317,520	0	0	0	1,217,160
On Peak Energy Sales (kWh)	546,840	370,440	546,840	529,200	546,840	211,680	169,344	218,736	211,680	546,840	529,200	546,840	4,974,480
Off Peak Energy Sales (kWh)	760,693	520,380	765,576	740,880	765,576	739,116	594,468	765,576	740,880	765,576	740,880	748,752	8,648,353
AMPAC Energy Sales (kWh)	1,307,533	890,820	1,312,416	1,270,080	1,312,416	1,268,316	1,017,828	1,312,416	1,270,080	1,312,416	1,270,080	1,295,592	14,839,993
SMUD - GS TOU Rate													
Super Peak Energy Rate ($/kWh)	$ -	$ -	$ -	$ -	$ -	$ 0.1203	$ 0.1203	$ 0.1203	$ 0.1203	$ -	$ -	$ -	$ 0.1204
On Peak Energy Rate ($/kWh)	$ 0.0883	$ 0.0883	$ 0.0883	$ 0.0883	$ 0.0883	$ 0.1057	$ 0.1057	$ 0.1057	$ 0.1057	$ 0.0883	$ 0.0883	$ 0.0883	$ 0.0911
Off Peak Energy Rate ($/kWh)	$ 0.0699	$ 0.0699	$ 0.0699	$ 0.0699	$ 0.0699	$ 0.0863	$ 0.0863	$ 0.0863	$ 0.0863	$ 0.0699	$ 0.0699	$ 0.0699	$ 0.0753
AMPAC Energy Revenues													
Super Peak Energy Revenues ($)	$ -	$ -	$ -	$ -	$ -	$ 38,200	$ 30,600	$ 39,500	$ 38,200	$ -	$ -	$ -	$ 146,500
On Peak Energy Revenues ($)	$ 48,300	$ 32,700	$ 48,300	$ 46,700	$ 48,300	$ 22,400	$ 17,900	$ 23,100	$ 22,400	$ 48,300	$ 46,700	$ 48,300	$ 453,400
Off Peak Energy Revenues ($)	$ 53,200	$ 36,400	$ 53,500	$ 51,800	$ 53,500	$ 63,800	$ 51,300	$ 66,100	$ 63,900	$ 53,500	$ 51,800	$ 52,300	$ 651,100
AMPAC Energy Revenues ($)	$ 101,500	$ 69,100	$ 101,800	$ 98,500	$ 101,800	$ 124,400	$ 99,800	$ 128,700	$ 124,500	$ 101,800	$ 98,500	$ 100,600	$ 1,251,000
SMUD Grid Energy Sales													
Super Peak Energy Sales (kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0
On Peak Energy Sales (kWh)	1,365	0	0	0	0	0	0	0	0	0	0	4,884	6,249
Off Peak Energy Sales (kWh)	3,518	0	0	0	0	0	0	0	0	0	0	11,939	15,457
SMUD Grid Energy Sales (kWh)	4,883	0	0	0	0	0	0	0	0	0	0	16,824	21,707
SMUD - FIT Rate													
Super Peak Energy Rate ($/kWh)	$ 0.0606	$ 0.0606	$ 0.0505	$ 0.0505	$ 0.0505	$ 0.2235	$ 0.2235	$ 0.2235	$ 0.2235	$ 0.0606	$ 0.0606	$ 0.0606	$ -
On Peak Energy Rate ($/kWh)	$ 0.0551	$ 0.0551	$ 0.0486	$ 0.0486	$ 0.0486	$ 0.0583	$ 0.0583	$ 0.0583	$ 0.0583	$ 0.0551	$ 0.0551	$ 0.0551	$ 0.0640
Off Peak Energy Rate ($/kWh)	$ 0.0433	$ 0.0433	$ 0.0374	$ 0.0374	$ 0.0374	$ 0.0499	$ 0.0499	$ 0.0499	$ 0.0499	$ 0.0433	$ 0.0433	$ 0.0433	$ 0.0453
SMUD Grid Energy Revenues													
Super Peak Energy Revenues ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
On Peak Energy Revenues ($)	$ 100	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 300	$ 400
Off Peak Energy Revenues ($)	$ 200	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 500	$ 700
SMUD Grid Energy Revenues ($)	$ 300	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 800	$ 1,100
Total CHP Plant Energy Revenues													
AMPAC Energy Revenues ($)	$ 101,500	$ 69,100	$ 101,800	$ 98,500	$ 101,800	$ 124,400	$ 99,800	$ 128,700	$ 124,500	$ 101,800	$ 98,500	$ 100,600	$ 1,251,000
SMUD Grid Energy Revenues ($)	$ 300	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 800	$ 1,100
Total Energy Revenues ($)	$ 101,800	$ 69,100	$ 101,800	$ 98,500	$ 101,800	$ 124,400	$ 99,800	$ 128,700	$ 124,500	$ 101,800	$ 98,500	$ 101,400	$ 1,252,100

5.1 ANNUAL ELECTRIC REVENUES

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
			Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
Electric Generation Capacity																
North CHP Plant Generation Capacity (kW)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Generation Capacity (kW)	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764
Total Generation Capacity (kW)	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764
Electric Generation Energy																
North CHP Plant Generation (kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Generation (kWh)	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700
Total CHP Plant Generation (kWh)	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700
Total Energy Sales																
AMPAC Energy Sales (kWh)	14,839,993	14,839,993	14,839,993	14,839,993	14,839,993	14,839,993	14,839,993	14,839,993	14,839,993	14,839,993	14,839,993	14,839,993	14,839,993	14,839,993	14,839,993	14,839,993
SMUD Grid Energy Sales (kWh)	21,707	21,707	21,707	21,707	21,707	21,707	21,707	21,707	21,707	21,707	21,707	21,707	21,707	21,707	21,707	21,707
Total CHP Plant Generation (kWh)	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700
AMPAC Energy Sales																
Super Peak Energy Sales (kWh)	1,217,160	1,217,160	1,217,160	1,217,160	1,217,160	1,217,160	1,217,160	1,217,160	1,217,160	1,217,160	1,217,160	1,217,160	1,217,160	1,217,160	1,217,160	1,217,160
On Peak Energy Sales (kWh)	4,974,480	4,974,480	4,974,480	4,974,480	4,974,480	4,974,480	4,974,480	4,974,480	4,974,480	4,974,480	4,974,480	4,974,480	4,974,480	4,974,480	4,974,480	4,974,480
Off Peak Energy Sales (kWh)	8,648,353	8,648,353	8,648,353	8,648,353	8,648,353	8,648,353	8,648,353	8,648,353	8,648,353	8,648,353	8,648,353	8,648,353	8,648,353	8,648,353	8,648,353	8,648,353
AMPAC Energy Sales (kWh)	14,839,993	14,839,993	14,839,993	14,839,993	14,839,993	14,839,993	14,839,993	14,839,993	14,839,993	14,839,993	14,839,993	14,839,993	14,839,993	14,839,993	14,839,993	14,839,993
SMUD - GS TOU Rate																
Super Peak Energy Rate ($/kWh)	$ 0.1204	$ 0.1236	$ 0.1286	$ 0.1337	$ 0.1391	$ 0.1446	$ 0.1504	$ 0.1565	$ 0.1627	$ 0.1692	$ 0.1760	$ 0.1830	$ 0.1903	$ 0.1980	$ 0.2059	$ 0.2141
On Peak Energy Rate ($/kWh)	$ 0.0911	$ 0.0936	$ 0.0974	$ 0.1013	$ 0.1053	$ 0.1095	$ 0.1139	$ 0.1185	$ 0.1232	$ 0.1281	$ 0.1333	$ 0.1386	$ 0.1441	$ 0.1499	$ 0.1559	$ 0.1621
Off Peak Energy Rate ($/kWh)	$ 0.0753	$ 0.0773	$ 0.0804	$ 0.0837	$ 0.0870	$ 0.0905	$ 0.0941	$ 0.0979	$ 0.1018	$ 0.1058	$ 0.1101	$ 0.1145	$ 0.1191	$ 0.1238	$ 0.1288	$ 0.1339
AMPAC Energy Revenues																
Super Peak Energy Revenues ($)	$ 146,500	$ 150,500	$ 156,500	$ 162,800	$ 169,300	$ 176,100	$ 183,100	$ 190,400	$ 198,000	$ 206,000	$ 214,200	$ 222,800	$ 231,700	$ 241,000	$ 250,600	$ 260,600
On Peak Energy Revenues ($)	$ 453,400	$ 465,800	$ 484,400	$ 503,800	$ 523,900	$ 544,900	$ 566,700	$ 589,300	$ 612,900	$ 637,400	$ 662,900	$ 689,500	$ 717,000	$ 745,700	$ 775,500	$ 806,600
Off Peak Energy Revenues ($)	$ 651,100	$ 668,900	$ 695,600	$ 723,400	$ 752,400	$ 782,500	$ 813,800	$ 846,300	$ 880,200	$ 915,400	$ 952,000	$ 990,100	$ 1,029,700	$ 1,070,900	$ 1,113,700	$ 1,158,200
AMPAC Energy Revenues ($)	$ 1,251,000	$ 1,285,200	$ 1,336,500	$ 1,390,000	$ 1,445,600	$ 1,503,500	$ 1,563,600	$ 1,626,000	$ 1,691,100	$ 1,758,800	$ 1,829,100	$ 1,902,400	$ 1,978,400	$ 2,057,600	$ 2,139,800	$ 2,225,400
SMUD Grid Energy Sales																
Super Peak Energy Sales (kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
On Peak Energy Sales (kWh)	6,249	6,249	6,249	6,249	6,249	6,249	6,249	6,249	6,249	6,249	6,249	6,249	6,249	6,249	6,249	6,249
Off Peak Energy Sales (kWh)	15,457	15,457	15,457	15,457	15,457	15,457	15,457	15,457	15,457	15,457	15,457	15,457	15,457	15,457	15,457	15,457
SMUD Grid Energy Sales (kWh)	21,707	21,707	21,707	21,707	21,707	21,707	21,707	21,707	21,707	21,707	21,707	21,707	21,707	21,707	21,707	21,707
SMUD - FIT Rate																
Super Peak Energy Rate ($/kWh)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
On Peak Energy Rate ($/kWh)	$ 0.0640	$ 0.0654	$ 0.0717	$ 0.0729	$ 0.0742	$ 0.0754	$ 0.0767	$ 0.0780	$ 0.0794	$ 0.0807	$ 0.0821	$ 0.0835	$ 0.0849	$ 0.0863	$ 0.0878	$ 0.0893
Off Peak Energy Rate ($/kWh)	$ 0.0453	$ 0.0464	$ 0.0509	$ 0.0518	$ 0.0526	$ 0.0535	$ 0.0544	$ 0.0554	$ 0.0563	$ 0.0573	$ 0.0582	$ 0.0592	$ 0.0602	$ 0.0613	$ 0.0623	$ 0.0634
SMUD Grid Energy Revenues																
Super Peak Energy Revenues ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
On Peak Energy Revenues ($)	$ 400	$ 400	$ 400	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 600
Off Peak Energy Revenues ($)	$ 700	$ 700	$ 800	$ 800	$ 800	$ 800	$ 800	$ 900	$ 900	$ 900	$ 900	$ 900	$ 900	$ 900	$ 1,000	$ 1,000
SMUD Grid Energy Revenues ($)	$ 1,100	$ 1,100	$ 1,200	$ 1,300	$ 1,300	$ 1,300	$ 1,300	$ 1,400	$ 1,400	$ 1,400	$ 1,400	$ 1,400	$ 1,400	$ 1,400	$ 1,500	$ 1,600
Total CHP Plant Energy Revenues																
AMPAC Energy Revenues ($)	$ 1,251,000	$ 1,285,200	$ 1,336,500	$ 1,390,000	$ 1,445,600	$ 1,503,500	$ 1,563,600	$ 1,626,000	$ 1,691,100	$ 1,758,800	$ 1,829,100	$ 1,902,400	$ 1,978,400	$ 2,057,600	$ 2,139,800	$ 2,225,400
SMUD Grid Energy Revenues ($)	$ 1,100	$ 1,100	$ 1,200	$ 1,300	$ 1,300	$ 1,300	$ 1,300	$ 1,400	$ 1,400	$ 1,400	$ 1,400	$ 1,400	$ 1,400	$ 1,400	$ 1,500	$ 1,600
Total Energy Revenues ($)	$ 1,252,100	$ 1,286,300	$ 1,337,700	$ 1,391,300	$ 1,446,900	$ 1,504,800	$ 1,564,900	$ 1,627,400	$ 1,692,500	$ 1,760,200	$ 1,830,500	$ 1,903,800	$ 1,979,800	$ 2,059,000	$ 2,141,300	$ 2,227,000

6.0 MONTHLY STEAM REVENUES

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2010
Steam Generation Capacity													
North CHP Plant Generation Capacity (lbs/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Generation Capacity (lbs/hr)	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300
Total Generation Capacity (lbs/hr)	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300
Steam Generation													
North CHP Plant Steam Generation (lbs)	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Steam Generation (lbs)	4,687,200	3,181,500	4,687,200	4,536,000	4,687,200	4,529,700	3,635,100	4,687,200	4,536,000	4,687,200	4,536,000	4,687,200	53,077,500
Total CHP Plant Steam Generation (lbs)	4,687,200	3,181,500	4,687,200	4,536,000	4,687,200	4,529,700	3,635,100	4,687,200	4,536,000	4,687,200	4,536,000	4,687,200	53,077,500
North CHP Plant Steam Revenues													
North CHP Plant Steam Generation (lbs)	0	0	0	0	0	0	0	0	0	0	0	0	0
Steam Enthalpy (Btu/lb)	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047
North CHP Plant Steam Generation (MMBtu)	0	0	0	0	0	0	0	0	0	0	0	0	0
Existing Boiler Efficiency (%)	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Natural Gas Fuel Units (MMBtu)	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural Gas Unit Fuel Price City Gate ($/MMBtu)	$6.37/MMBtu	$5.73/MMBtu	$5.15/MMBtu	$4.46/MMBtu	$4.52/MMBtu	$4.29/MMBtu	$4.66/MMBtu	$4.44/MMBtu	$3.63/MMBtu	$4.09/MMBtu	$3.96/MMBtu	$4.65/MMBtu	$0.00/MMBtu
North CHP Plant Steam Revenue - Gas Credit ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Natural Gas Fuel Units (MMBtu)	0	0	0	0	0	0	0	0	0	0	0	0	0
Transportation G-NR2 Up to 400 MMBtu ($/MMBtu)	$4.02/MMBtu	$4.02/MMBtu	$4.02/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$4.02/MMBtu	$4.02/MMBtu	
Transportation G-NR2 Over 400 MMBtu ($/MMBtu)	$1.57/MMBtu	$1.57/MMBtu	$1.57/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.57/MMBtu	$1.57/MMBtu	
Transportation G-NR2 Average ($/MMBtu)	$1.73/MMBtu	$1.81/MMBtu	$1.73/MMBtu	$1.43/MMBtu	$1.42/MMBtu	$1.43/MMBtu	$1.45/MMBtu	$1.42/MMBtu	$1.43/MMBtu	$1.42/MMBtu	$1.74/MMBtu	$1.73/MMBtu	$0.00/MMBtu
North CHP Plant Steam Revenue - Gas Trans Credit ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
North CHP Plant Steam Generation (lbs)	0	0	0	0	0	0	0	0	0	0	0	0	0
North CHP Plant Steam Revenue ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
North CHP Plant Steam Revenue ($/1000 lb)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
South CHP Plant Steam Revenues													
South CHP Plant Steam Generation (lbs)	4,687,200	3,181,500	4,687,200	4,536,000	4,687,200	4,529,700	3,635,100	4,687,200	4,536,000	4,687,200	4,536,000	4,687,200	53,077,500
Steam Enthalpy (Btu/lb)	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047
South CHP Plant Steam Generation (MMBtu)	4,907	3,331	4,907	4,749	4,907	4,743	3,806	4,907	4,749	4,907	4,749	4,907	55,572
Existing Boiler Efficiency (%)	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Natural Gas Fuel Units (MMBtu)	5,774	3,919	5,774	5,587	5,774	5,580	4,478	5,774	5,587	5,774	5,587	5,774	65,379
Natural Gas Unit Fuel Price City Gate ($/MMBtu)	$6.37/MMBtu	$5.73/MMBtu	$5.15/MMBtu	$4.46/MMBtu	$4.52/MMBtu	$4.29/MMBtu	$4.66/MMBtu	$4.44/MMBtu	$3.63/MMBtu	$4.09/MMBtu	$3.96/MMBtu	$4.65/MMBtu	$4.64/MMBtu
South CHP Plant Steam Revenue - Gas Credit ($)	$ 36,800	$ 22,500	$ 29,700	$ 24,900	$ 26,100	$ 23,900	$ 20,900	$ 25,600	$ 20,300	$ 23,600	$ 22,100	$ 26,800	$ 303,200
Natural Gas Fuel Units (MMBtu)	5,774	3,919	5,774	5,587	5,774	5,580	4,478	5,774	5,587	5,774	5,587	5,774	65,379
Transportation G-NR2 Up to 400 MMBtu ($/MMBtu)	$4.02/MMBtu	$4.02/MMBtu	$4.02/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$4.02/MMBtu	$4.02/MMBtu	
Transportation G-NR2 Over 400 MMBtu ($/MMBtu)	$1.57/MMBtu	$1.57/MMBtu	$1.57/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.57/MMBtu	$1.57/MMBtu	
Transportation G-NR2 Average ($/MMBtu)	$1.73/MMBtu	$1.81/MMBtu	$1.73/MMBtu	$1.43/MMBtu	$1.42/MMBtu	$1.43/MMBtu	$1.45/MMBtu	$1.42/MMBtu	$1.43/MMBtu	$1.42/MMBtu	$1.74/MMBtu	$1.73/MMBtu	$1.56/MMBtu
South CHP Plant Steam Revenue - Gas Trans. Credit ($)	$ 10,000	$ 7,100	$ 10,000	$ 8,000	$ 8,200	$ 8,000	$ 6,500	$ 8,200	$ 8,000	$ 8,200	$ 9,700	$ 10,000	$ 101,900
South CHP Plant Steam Generation (lbs)	4,687,200	3,181,500	4,687,200	4,536,000	4,687,200	4,529,700	3,635,100	4,687,200	4,536,000	4,687,200	4,536,000	4,687,200	53,077,500
South CHP Plant Steam Revenue ($)	$ 46,800	$ 29,600	$ 39,700	$ 32,900	$ 34,300	$ 31,900	$ 27,400	$ 33,800	$ 28,300	$ 31,800	$ 31,800	$ 36,800	$ 405,100
South CHP Plant Steam Revenue ($/1000 lb)	$ 9.9846	$ 9.3038	$ 8.4699	$ 7.2531	$ 7.3178	$ 7.0424	$ 7.5376	$ 7.2111	$ 6.2390	$ 6.7844	$ 7.0106	$ 7.8512	$ 7.6322
Total CHP Plant Steam Revenues													
North CHP Plant Steam Revenue ($)	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Steam Revenue ($)	$ 46,800	$ 29,600	$ 39,700	$ 32,900	$ 34,300	$ 31,900	$ 27,400	$ 33,800	$ 28,300	$ 31,800	$ 31,800	$ 36,800	$ 405,100
Total CHP Plant Steam Revenue ($)	$ 46,800	$ 29,600	$ 39,700	$ 32,900	$ 34,300	$ 31,900	$ 27,400	$ 33,800	$ 28,300	$ 31,800	$ 31,800	$ 36,800	$ 405,100

6.1 ANNUAL STEAM REVENUES

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
			Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
Steam Generation Capacity																
North CHP Plant Generation Capacity (lbs/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Generation Capacity (lbs/hr)	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300
Total Generation Capacity (lbs/hr)	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300
Steam Generation																
North CHP Plant Steam Generation (lbs)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Steam Generation (lbs)	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500
Total CHP Plant Steam Generation (lbs)	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500
North CHP Plant Steam Revenues																
North CHP Plant Steam Generation (lbs)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Steam Enthalpy (Btu/lb)	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047
North CHP Plant Steam Generation (MMBtu)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Existing Boiler Efficiency (%)	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Natural Gas Fuel Units (MMBtu)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural Gas Unit Fuel Price City Gate ($/MMBtu)	$4.66/MMBtu	$4.29/MMBtu	$3.31/MMBtu	$4.15/MMBtu	$4.55/MMBtu	$4.80/MMBtu	$5.03/MMBtu	$5.26/MMBtu	$5.50/MMBtu	$5.76/MMBtu	$6.01/MMBtu	$6.28/MMBtu	$6.56/MMBtu	$6.86/MMBtu	$7.16/MMBtu	$7.48/MMBtu
North CHP Plant Steam Revenue - Gas Credit ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Natural Gas Fuel Units (MMBtu)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transportation G-NR2 Average ($/MMBtu)	$1.56/MMBtu	$1.57/MMBtu	$1.59/MMBtu	$1.61/MMBtu	$1.62/MMBtu	$1.64/MMBtu	$1.65/MMBtu	$1.67/MMBtu	$1.69/MMBtu	$1.70/MMBtu	$1.72/MMBtu	$1.74/MMBtu	$1.76/MMBtu	$1.77/MMBtu	$1.79/MMBtu	$1.81/MMBtu
North CHP Plant Steam Revenue - Gas Trans Credit ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
North CHP Plant Steam Generation (lbs)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North CHP Plant Steam Revenue ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
North CHP Plant Steam Revenue ($/1000 lb)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
South CHP Plant Steam Revenues																
South CHP Plant Steam Generation (lbs)	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500
Steam Enthalpy (Btu/lb)	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047
South CHP Plant Steam Generation (MMBtu)	55,572	55,572	55,572	55,572	55,572	55,572	55,572	55,572	55,572	55,572	55,572	55,572	55,572	55,572	55,572	55,572
Existing Boiler Efficiency (%)	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Natural Gas Fuel Units (MMBtu)	65,379	65,379	65,379	65,379	65,379	65,379	65,379	65,379	65,379	65,379	65,379	65,379	65,379	65,379	65,379	65,379
Natural Gas Unit Fuel Price City Gate ($/MMBtu)	$4.66/MMBtu	$4.29/MMBtu	$3.31/MMBtu	$4.15/MMBtu	$4.55/MMBtu	$4.80/MMBtu	$5.03/MMBtu	$5.26/MMBtu	$5.50/MMBtu	$5.76/MMBtu	$6.01/MMBtu	$6.28/MMBtu	$6.56/MMBtu	$6.86/MMBtu	$7.16/MMBtu	$7.48/MMBtu
South CHP Plant Steam Revenue - Gas Credit ($)	$ 303,200	280,300	216,500	271,300	297,500	313,900	328,800	344,100	359,900	376,300	393,100	410,700	429,100	448,300	468,400	489,300
Natural Gas Fuel Units (MMBtu)	65,379	65,379	65,379	65,379	65,379	65,379	65,379	65,379	65,379	65,379	65,379	65,379	65,379	65,379	65,379	65,379
Transportation G-NR2 Average ($/MMBtu)	$1.56/MMBtu	$1.57/MMBtu	$1.59/MMBtu	$1.61/MMBtu	$1.62/MMBtu	$1.64/MMBtu	$1.65/MMBtu	$1.67/MMBtu	$1.69/MMBtu	$1.70/MMBtu	$1.72/MMBtu	$1.74/MMBtu	$1.76/MMBtu	$1.77/MMBtu	$1.79/MMBtu	$1.81/MMBtu
South CHP Plant Steam Revenue - Gas Trans. Credit ($)	$ 101,900	102,900	103,900	105,000	106,000	107,100	108,200	109,300	110,300	111,400	112,600	113,700	114,800	116,000	117,100	118,300
South CHP Plant Steam Generation (lbs)	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500	53,077,500
South CHP Plant Steam Revenue ($)	$ 405,100	$ 383,200	$ 320,400	$ 376,300	$ 403,500	$ 421,000	$ 437,000	$ 453,400	$ 470,200	$ 487,700	$ 505,700	$ 524,400	$ 543,900	$ 564,300	$ 585,500	$ 607,600
South CHP Plant Steam Revenue ($/1000 lb)	$ 7.6322	$ 7.2196	$ 6.0365	$ 7.0896	$ 7.6021	$ 7.9318	$ 8.2332	$ 8.5422	$ 8.8587	$ 9.1885	$ 9.5276	$ 9.8799	$ 10.2473	$ 10.6316	$ 11.0310	$ 11.4474
Total CHP Plant Steam Revenues																
North CHP Plant Steam Revenue ($)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Steam Revenue ($)	$ 405,100	$ 383,200	$ 320,400	$ 376,300	$ 403,500	$ 421,000	$ 437,000	$ 453,400	$ 470,200	$ 487,700	$ 505,700	$ 524,400	$ 543,900	$ 564,300	$ 585,500	$ 607,600
Total CHP Plant Steam Revenue ($)	$ 405,100	$ 383,200	$ 320,400	$ 376,300	$ 403,500	$ 421,000	$ 437,000	$ 453,400	$ 470,200	$ 487,700	$ 505,700	$ 524,400	$ 543,900	$ 564,300	$ 585,500	$ 607,600

6.0a ANNUAL WASTE DISPOSAL REVENUES

Total CHP Plant Waste Disposal Revenues [1]																
North CHP Plant Waste Disposal Revenue ($)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Waste Disposal Revenue ($)	$ 2,146,000	$ 2,188,900	$ 2,232,700	$ 2,277,400	$ 2,322,900	$ 2,369,400	$ 2,416,800	$ 2,465,100	$ 2,514,400	$ 2,564,700	$ 2,616,000	$ 2,668,300	$ 2,721,700	$ 2,776,100	$ 2,831,600	$ 2,888,200
Total CHP Plant Waste Disposal Revenue ($)	$ 2,146,000	$ 2,188,900	$ 2,232,700	$ 2,277,400	$ 2,322,900	$ 2,369,400	$ 2,416,800	$ 2,465,100	$ 2,514,400	$ 2,564,700	$ 2,616,000	$ 2,668,300	$ 2,721,700	$ 2,776,100	$ 2,831,600	$ 2,888,200

[1] Estimated to be $2,146,000 annually, inflatted at 2.0% per year.

7.0 MONTHLY PRODUCTION COSTS

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2012
Electric Generation Capacity													
North CHP Plant Generation Capacity (kW)	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Generation Capacity (kW)	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764
Total Generation Capacity (kW)	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764
Electric Generation Energy													
North CHP Plant Generation (kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Generation (kWh)	1,312,416	890,820	1,312,416	1,270,080	1,312,416	1,268,316	1,017,828	1,312,416	1,270,080	1,312,416	1,270,080	1,312,416	14,861,700
Total CHP Plant Generation (kWh)	1,312,416	890,820	1,312,416	1,270,080	1,312,416	1,268,316	1,017,828	1,312,416	1,270,080	1,312,416	1,270,080	1,312,416	14,861,700
North CHP Plant Production Costs													
North CHP Plant Generation Capacity (kW)	0	0	0	0	0	0	0	0	0	0	0	0	0
North CHP Plant Generation (kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0
North CHP Plant Heat Rate HHV (Btu/kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0
North CHP Plant Fuel Use HHV (MMBtu)	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural Gas Unit Fuel Price City Gate ($/MMBtu)	$6.37/MMBtu	$5.73/MMBtu	$5.15/MMBtu	$4.46/MMBtu	$4.52/MMBtu	$4.29/MMBtu	$4.66/MMBtu	$4.44/MMBtu	$3.63/MMBtu	$4.09/MMBtu	$3.96/MMBtu	$4.65/MMBtu	$0.00/MMBtu
North CHP Plant Natural Gas Fuel Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0
North CHP Plant Fuel Use HHV (MMBtu)	0	0	0	0	0	0	0	0	0	0	0	0	0
Transportation G-EG ($/MMBtu)	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.00/MMBtu
North CHP Plant Natural Gas Transportation Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0
Total North CHP Plant Natural Gas Use (MMBtu)	0	0	0	0	0	0	0	0	0	0	0	0	0
Total North CHP Plant Natural Gas Fuel Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total North CHP Plant Natural Gas Fuel Cost ($/MMBtu)													
South CHP Plant Production Costs													
South CHP Plant Generation Capacity (kW)	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764
South CHP Plant Generation (kWh)	1,312,416	890,820	1,312,416	1,270,080	1,312,416	1,268,316	1,017,828	1,312,416	1,270,080	1,312,416	1,270,080	1,312,416	14,861,700
South CHP Plant Heat Rate HHV (Btu/kWh)	10,601	10,601	10,601	10,601	10,601	10,601	10,601	10,601	10,601	10,601	10,601	10,601	10,601
GROSS South CHP Plant Fuel Use HHV (MMBtu)	13,913	9,444	13,913	13,464	13,913	13,445	10,790	13,913	13,464	13,913	13,464	13,913	157,548
Maximum Waste to Fuel Natural Gas Offset (MMBtu)	12,648	11,424	12,648	12,240	12,648	12,240	12,648	12,648	12,240	12,648	12,240	12,648	148,920
NET South CHP Plant Fuel Use HHV (MMBtu)	1,265	0	1,265	1,224	1,265	1,205	0	1,265	1,224	1,265	1,224	1,265	12,466
Natural Gas Unit Fuel Price City Gate ($/MMBtu)	$6.37/MMBtu	$5.73/MMBtu	$5.15/MMBtu	$4.46/MMBtu	$4.52/MMBtu	$4.29/MMBtu	$4.66/MMBtu	$4.44/MMBtu	$3.63/MMBtu	$4.09/MMBtu	$3.96/MMBtu	$4.65/MMBtu	$4.56/MMBtu
South CHP Plant Natural Gas Fuel Cost ($)	$ 8,100	$ -	$ 6,500	$ 5,500	$ 5,700	$ 5,200	$ -	$ 5,600	$ 4,400	$ 5,200	$ 4,800	$ 5,900	56,900
South CHP Plant Fuel Use HHV (MMBtu)	1,265	0	1,265	1,224	1,265	1,205	0	1,265	1,224	1,265	1,224	1,265	12,466
Transportation G-EG ($/MMBtu)	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.32/MMBtu
South CHP Plant Natural Gas Transportation Cost ($)	$ 400	$ -	$ 400	$ 400	$ 400	$ 400	$ -	$ 400	$ 400	$ 400	$ 400	$ 400	$ 4,000
Total South CHP Plant Natural Gas Use (MMBtu)	1,265	0	1,265	1,224	1,265	1,205	0	1,265	1,224	1,265	1,224	1,265	12,466
Total South CHP Plant Natural Gas Fuel Cost ($)	$ 8,500	$ -	$ 6,900	$ 5,900	$ 6,100	$ 5,600	$ -	$ 6,000	$ 4,800	$ 5,600	$ 5,200	$ 6,300	$ 60,900
Total South CHP Plant Natural Gas Fuel Cost ($/MMBtu)	$6.72/MMBtu		$5.46/MMBtu	$4.82/MMBtu	$4.82/MMBtu	$4.65/MMBtu		$4.74/MMBtu	$3.92/MMBtu	$4.43/MMBtu	$4.25/MMBtu	$4.98/MMBtu	$4.89/MMBtu
Total CHP Plant Production Costs													
Total Natural Gas Fuel Use (MMBtu)	1,265	0	1,265	1,224	1,265	1,205	0	1,265	1,224	1,265	1,224	1,265	12,466
Total Natural Gas Fuel Cost ($)	$ 8,500	$ -	$ 6,900	$ 5,900	$ 6,100	$ 5,600	$ -	$ 6,000	$ 4,800	$ 5,600	$ 5,200	$ 6,300	$ 60,900
Total Natural Gas Fuel Cost ($/MMBtu)	$6.72/MMBtu		$5.46/MMBtu	$4.82/MMBtu	$4.82/MMBtu	$4.65/MMBtu		$4.74/MMBtu	$3.92/MMBtu	$4.43/MMBtu	$4.25/MMBtu	$4.98/MMBtu	$4.89/MMBtu

7.1 ANNUAL PRODUCTION COSTS

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
			Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
Electric Generation Capacity																
North CHP Plant Generation Capacity (kW)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Generation Capacity (kW)	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764
Total Generation Capacity (kW)	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764
Electric Generation Energy																
North CHP Plant Generation (kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Generation (kWh)	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700
Total CHP Plant Generation (kWh)	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700
North CHP Plant Production Costs																
North CHP Plant Generation Capacity (kW)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North CHP Plant Generation (kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North CHP Plant Heat Rate HHV (Btu/kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North CHP Plant Fuel Use HHV (MMBtu)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural Gas Unit Fuel Price City Gate ($/MMBtu)	$4.66/MMBtu	$4.29/MMBtu	$3.31/MMBtu	$4.15/MMBtu	$4.55/MMBtu	$4.80/MMBtu	$5.03/MMBtu	$5.26/MMBtu	$5.50/MMBtu	$5.76/MMBtu	$6.01/MMBtu	$6.28/MMBtu	$6.56/MMBtu	$6.86/MMBtu	$7.16/MMBtu	$7.48/MMBtu
North CHP Plant Natural Gas Fuel Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
North CHP Plant Fuel Use HHV (MMBtu)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transportation G-EG ($/MMBtu)	$0.32/MMBtu	$0.32/MMBtu	$0.33/MMBtu	$0.33/MMBtu	$0.33/MMBtu	$0.34/MMBtu	$0.34/MMBtu	$0.34/MMBtu	$0.35/MMBtu	$0.35/MMBtu	$0.35/MMBtu	$0.36/MMBtu	$0.36/MMBtu	$0.37/MMBtu	$0.37/MMBtu	$0.37/MMBtu
North CHP Plant Natural Gas Transportation Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total North CHP Plant Natural Gas Use (MMBtu)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total North CHP Plant Natural Gas Fuel Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total North CHP Plant Natural Gas Fuel Cost ($/MMBtu)																
South CHP Plant Production Costs																
South CHP Plant Generation Capacity (kW)	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764
South CHP Plant Generation (kWh)	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700	14,861,700
South CHP Plant Heat Rate HHV (Btu/kWh)	10,601	10,601	10,601	10,601	10,601	10,601	10,601	10,601	10,601	10,601	10,601	10,601	10,601	10,601	10,601	10,601
South CHP Plant Fuel Use HHV (MMBtu)	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466
Natural Gas Unit Fuel Price City Gate ($/MMBtu)	$4.56/MMBtu	$4.29/MMBtu	$3.31/MMBtu	$4.15/MMBtu	$4.55/MMBtu	$4.80/MMBtu	$5.03/MMBtu	$5.26/MMBtu	$5.50/MMBtu	$5.76/MMBtu	$6.01/MMBtu	$6.28/MMBtu	$6.56/MMBtu	$6.86/MMBtu	$7.16/MMBtu	$7.48/MMBtu
South CHP Plant Natural Gas Fuel Cost ($)	$ 56,900	$ 53,400	$ 41,300	$ 51,700	$ 56,700	$ 59,900	$ 62,700	$ 65,600	$ 68,600	$ 71,700	$ 75,000	$ 78,300	$ 81,800	$ 85,500	$ 89,300	$ 93,300
South CHP Plant Fuel Use HHV (MMBtu)	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466
Transportation G-EG ($/MMBtu)	$0.32/MMBtu	$0.32/MMBtu	$0.33/MMBtu	$0.33/MMBtu	$0.33/MMBtu	$0.34/MMBtu	$0.34/MMBtu	$0.34/MMBtu	$0.35/MMBtu	$0.35/MMBtu	$0.35/MMBtu	$0.36/MMBtu	$0.36/MMBtu	$0.37/MMBtu	$0.37/MMBtu	$0.37/MMBtu
South CHP Plant Natural Gas Transportation Cost ($)	$ 4,000	$ 4,000	$ 4,100	$ 4,100	$ 4,200	$ 4,200	$ 4,200	$ 4,300	$ 4,300	$ 4,400	$ 4,400	$ 4,500	$ 4,500	$ 4,600	$ 4,600	$ 4,600
Total South CHP Plant Natural Gas Use (MMBtu)	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466
Total South CHP Plant Natural Gas Fuel Cost ($)	$ 60,900	$ 57,400	$ 45,400	$ 55,800	$ 60,900	$ 64,100	$ 66,900	$ 69,900	$ 72,900	$ 76,100	$ 79,400	$ 82,800	$ 86,300	$ 90,100	$ 93,900	$ 97,900
Total South CHP Plant Natural Gas Fuel Cost ($/MMBtu)	$4.89/MMBtu	$4.60/MMBtu	$3.64/MMBtu	$4.48/MMBtu	$4.89/MMBtu	$5.14/MMBtu	$5.37/MMBtu	$5.61/MMBtu	$5.85/MMBtu	$6.10/MMBtu	$6.37/MMBtu	$6.64/MMBtu	$6.92/MMBtu	$7.23/MMBtu	$7.53/MMBtu	$7.85/MMBtu
Total CHP Plant Production Costs																
Total Natural Gas Fuel Use (MMBtu)	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466	12,466
Total Natural Gas Fuel Cost ($)	$ 60,900	$ 57,400	$ 45,400	$ 55,800	$ 60,900	$ 64,100	$ 66,900	$ 69,900	$ 72,900	$ 76,100	$ 79,400	$ 82,800	$ 86,300	$ 90,100	$ 93,900	$ 97,900
Total Natural Gas Fuel Cost ($/MMBtu)	$4.89/MMBtu	$4.60/MMBtu	$3.64/MMBtu	$4.48/MMBtu	$4.89/MMBtu	$5.14/MMBtu	$5.37/MMBtu	$5.61/MMBtu	$5.85/MMBtu	$6.10/MMBtu	$6.37/MMBtu	$6.64/MMBtu	$6.92/MMBtu	$7.23/MMBtu	$7.53/MMBtu	$7.85/MMBtu

8.0 OPERATION AND MAINTENANCE COSTS

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
			Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
Incremental Labor Costs																
Management (Qty)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Burdened Hourly Rate ($/hr)	$ 100.00	$ 102.00	$ 104.04	$ 106.12	$ 108.24	$ 110.41	$ 112.62	$ 114.87	$ 117.17	$ 119.51	$ 121.90	$ 124.34	$ 126.82	$ 129.36	$ 131.95	$ 134.59
Escalation (%)	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Management Labor Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Additional Operators (Qty)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Burdened Hourly Rate ($/hr)	$ 50.00	$ 51.00	$ 52.02	$ 53.06	$ 54.12	$ 55.20	$ 56.31	$ 57.43	$ 58.58	$ 59.75	$ 60.95	$ 62.17	$ 63.41	$ 64.68	$ 65.97	$ 67.29
Escalation (%)	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Operator Labor Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Additional Maintenance Techs (Qty)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Burdened Hourly Rate ($/hr)	$ 50.00	$ 51.00	$ 52.02	$ 53.06	$ 54.12	$ 55.20	$ 56.31	$ 57.43	$ 58.58	$ 59.75	$ 60.95	$ 62.17	$ 63.41	$ 64.68	$ 65.97	$ 67.29
Escalation (%)	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Maintenance Techs Labor Cost ($)	$ 104,000	$ 106,100	$ 108,200	$ 110,400	$ 112,600	$ 114,800	$ 117,100	$ 119,500	$ 121,900	$ 124,300	$ 126,800	$ 129,300	$ 131,900	$ 134,500	$ 137,200	$ 140,000
Total Additional Labor Cost ($)	$ 104,000	$ 106,100	$ 108,200	$ 110,400	$ 112,600	$ 114,800	$ 117,100	$ 119,500	$ 121,900	$ 124,300	$ 126,800	$ 129,300	$ 131,900	$ 134,500	$ 137,200	$ 140,000
North Plant CHP Maintenance Cost																
Number of Units	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Prime Mover Maintenance Cost ($/unit)	$ 301,500	$ 310,500	$ 319,800	$ 329,400	$ 339,300	$ 349,500	$ 360,000	$ 370,800	$ 381,900	$ 393,400	$ 405,200	$ 417,400	$ 429,900	$ 442,800	$ 456,100	$ 469,800
Escalation (%)	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
Total Prime Mover Maintenance Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
South Plant CHP Maintenance Cost																
Number of Units	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Prime Mover Maintenance Cost ($/unit)	$ 301,500	$ 310,500	$ 319,800	$ 329,400	$ 339,300	$ 349,500	$ 360,000	$ 370,800	$ 381,900	$ 393,400	$ 405,200	$ 417,400	$ 429,900	$ 442,800	$ 456,100	$ 469,800
Escalation (%)	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
Total Prime Mover Maintenance Cost ($)	$ 301,500	$ 310,500	$ 319,800	$ 329,400	$ 339,300	$ 349,500	$ 360,000	$ 370,800	$ 381,900	$ 393,400	$ 405,200	$ 417,400	$ 429,900	$ 442,800	$ 456,100	$ 469,800
Total Additional Maintenance Cost ($)	$ 301,500	$ 310,500	$ 319,800	$ 329,400	$ 339,300	$ 349,500	$ 360,000	$ 370,800	$ 381,900	$ 393,400	$ 405,200	$ 417,400	$ 429,900	$ 442,800	$ 456,100	$ 469,800

9.0 FINANCING

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
			Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
Financing Assumptions																
Debt Term (years)	20.00															
Interest Rate	10.00%															
Investment Tax Credit	10%															
Capital Cost	$ 11,972,800															
Less SGIP Incentive	$ (691,000)															
Less Tax Credit	$ (1,197,300)															
Financed Amount	$ 10,084,500															
Debt Financed	100.00%															
Equity Financed	0.00%															
Total Debt Financing	$ 10,084,500															
Total Equity Financing	$ -															
Long Term Financing																
Interest Rate			10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%
Amount to Finance			$ 10,084,500													
Beginning Year Balance			$ 10,084,500	$ 9,908,500	$ 9,714,900	$ 9,501,900	$ 9,267,600	$ 9,009,900	$ 8,726,400	$ 8,414,500	$ 8,071,500	$ 7,694,200	$ 7,279,100	$ 6,822,500	$ 6,320,300	$ 5,767,800
Interest			$ 1,008,500	$ 990,900	$ 971,500	$ 950,200	$ 926,800	$ 901,000	$ 872,600	$ 841,500	$ 807,200	$ 769,400	$ 727,900	$ 682,300	$ 632,000	$ 576,800
Principal			$ 176,000	$ 193,600	$ 213,000	$ 234,300	$ 257,700	$ 283,500	$ 311,900	$ 343,000	$ 377,300	$ 415,100	$ 456,600	$ 502,200	$ 552,500	$ 607,700
Annual Debt Payment			$ 1,184,500	$ 1,184,500	$ 1,184,500	$ 1,184,500	$ 1,184,500	$ 1,184,500	$ 1,184,500	$ 1,184,500	$ 1,184,500	$ 1,184,500	$ 1,184,500	$ 1,184,500	$ 1,184,500	$ 1,184,500
End of Year Balance			$ 9,908,500	$ 9,714,900	$ 9,501,900	$ 9,267,600	$ 9,009,900	$ 8,726,400	$ 8,414,500	$ 8,071,500	$ 7,694,200	$ 7,279,100	$ 6,822,500	$ 6,320,300	$ 5,767,800	$ 5,160,100

10.0 DEPRECIATION

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
			Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
Capital Cost	$ 11,972,800															
Less SGIP Incentive	$ (691,000)															
Less Tax Credit	$ (1,197,300)															
Depreciable Basis [1]	$ 11,028,650															
Depreciation Method	MACRS 5-Year															
Depreciation Percentage			20.00%	32.00%	19.20%	11.52%	11.52%	5.76%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Depreciation Expense			$ 2,205,730	$ 3,529,168	$ 2,117,501	$ 1,270,500	$ 1,270,500	$ 635,250	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

[1] Depreciable Basis is equal to total project cost less the tax credits and rebate for which the project qualifies.

11.0 PRO FORMA

	2012	2013	2014 Year 1	2015 Year 2	2016 Year 3	2017 Year 4	2018 Year 5	2019 Year 6	2020 Year 7	2021 Year 8	2022 Year 9	2023 Year 10
INCOME STATEMENT												
Operating Revenues												
Electric Revenues	$ -	$ -	$ 1,337,700	$ 1,391,300	$ 1,446,900	$ 1,504,800	$ 1,564,900	$ 1,627,400	$ 1,692,500	$ 1,760,200	$ 1,830,500	$ 1,903,800
Steam Revenues	$ -	$ -	$ 320,400	$ 376,300	$ 403,500	$ 421,000	$ 437,000	$ 453,400	$ 470,200	$ 487,700	$ 505,700	$ 524,400
Waste Disposal Revenues	$ -	$ -	$ 2,232,700	$ 2,277,400	$ 2,322,900	$ 2,369,400	$ 2,416,800	$ 2,465,100	$ 2,514,400	$ 2,564,700	$ 2,616,000	$ 2,668,300
Total Operating Revenues	$ -	$ -	$ 3,890,800	$ 4,045,000	$ 4,173,300	$ 4,295,200	$ 4,418,700	$ 4,545,900	$ 4,677,100	$ 4,812,600	$ 4,952,200	$ 5,096,500
Operating Expenses												
Natural Gas Expenses	$ -	$ -	$ (45,400)	$ (55,800)	$ (60,900)	$ (64,100)	$ (66,900)	$ (69,900)	$ (72,900)	$ (76,100)	$ (79,400)	$ (82,800)
Additional Labor Expense	$ -	$ -	$ (108,200)	$ (110,400)	$ (112,600)	$ (114,800)	$ (117,100)	$ (119,500)	$ (121,900)	$ (124,300)	$ (126,800)	$ (129,300)
Additional Maintenance Expense	$ -	$ -	$ (319,800)	$ (329,400)	$ (339,300)	$ (349,500)	$ (360,000)	$ (370,800)	$ (381,900)	$ (393,400)	$ (405,200)	$ (417,400)
Total Operating Expenses			$ (473,400)	$ (495,600)	$ (512,800)	$ (528,400)	$ (544,000)	$ (560,200)	$ (576,700)	$ (593,800)	$ (611,400)	$ (629,500)
EBITDA	$ -	$ -	$ 3,417,400	$ 3,549,400	$ 3,660,500	$ 3,766,800	$ 3,874,700	$ 3,985,700	$ 4,100,400	$ 4,218,800	$ 4,340,800	$ 4,467,000
Non-Operating Expenses												
Interest Expense			$ (1,008,500)	$ (990,900)	$ (971,500)	$ (950,200)	$ (926,800)	$ (901,000)	$ (872,600)	$ (841,500)	$ (807,200)	$ (769,400)
Depreciation Expense			$ (2,205,730)	$ (3,529,168)	$ (2,117,501)	$ (1,270,500)	$ (1,270,500)	$ (635,250)	$ -	$ -	$ -	$ -
Total Non-Operating Expenses	$ -	$ -	$ (3,214,230)	$ (4,520,068)	$ (3,089,001)	$ (2,220,700)	$ (2,197,300)	$ (1,536,250)	$ (872,600)	$ (841,500)	$ (807,200)	$ (769,400)
EBT	$ -	$ -	$ 203,170	$ (970,668)	$ 571,499	$ 1,546,100	$ 1,677,400	$ 2,449,450	$ 3,227,800	$ 3,377,300	$ 3,533,600	$ 3,697,600
Taxes												
Investment Tax Credit	$ -	$ -	$ 1,197,300	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Federal and State Tax Shield (Tax Liability)	$ -	$ -	$ (81,300)	$ 388,300	$ (228,600)	$ (618,400)	$ (671,000)	$ (979,800)	$ (1,291,100)	$ (1,350,900)	$ (1,413,400)	$ (1,479,000)
Total Taxes	$ -	$ -	$ 1,116,000	$ 388,300	$ (228,600)	$ (618,400)	$ (671,000)	$ (979,800)	$ (1,291,100)	$ (1,350,900)	$ (1,413,400)	$ (1,479,000)
NET INCOME	$ -	$ -	$ 1,319,170	$ (582,368)	$ 342,899	$ 927,700	$ 1,006,400	$ 1,469,650	$ 1,936,700	$ 2,026,400	$ 2,120,200	$ 2,218,600
CASH FLOW STATEMENT												
Cash Flows Operating Activities												
Net Income	$ -	$ -	$ 1,319,170	$ (582,368)	$ 342,899	$ 927,700	$ 1,006,400	$ 1,469,650	$ 1,936,700	$ 2,026,400	$ 2,120,200	$ 2,218,600
Depreciation Expense	$ -	$ -	$ 2,205,730	$ 3,529,168	$ 2,117,501	$ 1,270,500	$ 1,270,500	$ 635,250	$ -	$ -	$ -	$ -
Net Cash Flows Operating Activities	$ -	$ -	$ 3,524,900	$ 2,946,800	$ 2,460,400	$ 2,198,200	$ 2,276,900	$ 2,104,900	$ 1,936,700	$ 2,026,400	$ 2,120,200	$ 2,218,600
Cash Flows Capital Financing and Investing Activities												
Proceeds From SGIP Rebate		$ 691,000										
Proceeds From Debt		$ 10,084,500										
Capital Acquisition Payments		$ (11,972,800)										
Principal Payments			$ (176,000)	$ (193,600)	$ (213,000)	$ (234,300)	$ (257,700)	$ (283,500)	$ (311,900)	$ (343,000)	$ (377,300)	$ (415,100)
Net Cash Flows Capital Financing and Investing Activities		$ (1,197,300)	$ (176,000)	$ (193,600)	$ (213,000)	$ (234,300)	$ (257,700)	$ (283,500)	$ (311,900)	$ (343,000)	$ (377,300)	$ (415,100)
Net Increase (Decrease) in Cash	$ -	$ (1,197,300)	$ 3,348,900	$ 2,753,200	$ 2,247,400	$ 1,963,900	$ 2,019,200	$ 1,821,400	$ 1,624,800	$ 1,683,400	$ 1,742,900	$ 1,803,500
Cumulative Positive Cash Flows												
Net Present Value		$ 12,874,100										
Discount Rate		**15.00%**										

OPTION 3 – SINGLE CHP PLANT WITH RECIPROCATING ENGINES

1.0 CHP ASSUMPTIONS

	SELECT CONFIGURATION			Option 1			Option 2			Option 3		
Configuration	**Option 3**											
Project Description	**Single CHP Plant Located at South Site - No Steam Interconnection**			Single CHP Plant Located at South Site - Supplying Steam to North and South Sites			Single CHP Plant Located at South Site - No Steam Interconnection			Single CHP Plant Located at South Site - No Steam Interconnection		
Site	**North Site**	**South Site**	**Total**	North Site	South Site	Total	North Site	South Site	Total	North Site	South Site	Total
Estimated Average Electrical Load (kW)	**0**	**1,500**	**1,500**	1,500	1,500	3,000		1,500	1,500		1,500	1,500
Maximum CHP Electric Generation (kW)	**0**	**5,000**	**5,000**	5,000	5,000	5,000		5,000	5,000		5,000	5,000
Minimum Steam Load (lb/hr)	**0**	**7,000**	**7,000**	5,500	7,000	12,500		7,000	7,000		7,000	7,000
Average Steam Load (lb/hr)	**0**	**15,000**	**15,000**	8,000	15,000	23,000		15,000	15,000		15,000	15,000
Max Steam Load (lb/hr)	**0**	**25,000**	**25,000**	12,000	25,000	37,000		25,000	25,000		25,000	25,000
Power Generation Technology	**0**	**Reciprocating Engine**	**Reciprocating Engine**		Combustion Turbine	Combustion Turbine		Microturbine	Microturbine		Reciprocating Engine	Reciprocating Engine
Manufacturer	**0**	**GE**	**GE**		Solar Turbines	Solar Turbines		Capstone	Capstone		GE	GE
Prime Mover	**0**	**Jenbacher JMS 416**	**Jenbacher JMS 416**		Mercury 50	Mercury 50		C200 x 9	C200 x 9		Jenbacher JMS 416	Jenbacher JMS 416
Number of Units	**0**	**2**	**2**		1	1		1	1		2	2
Gross Power Generation per Unit (kW)	**0**	**1,137**	**1,137**		4,419	4,419		1,800	1,800		1,137	1,137
Aux Load per Unit (kW)	**0**	**-23**	**-23**		-40	-40		-36	-36		-23	-23
Net Power Generation per Unit (kW)	**0**	**1,114**	**1,114**		4,379	4,379		1,764	1,764		1,114	1,114
Fuel Input per Unit LHV (MMBtu/hr)	**0.00**	**9.78**	**9.78**		40.10	40.10		17.00	17.00		9.78	9.78
Fuel Input per Unit HHV (MMBtu/hr)	**0.00**	**10.75**	**10.75**		44.11	44.11		18.70	18.70		10.75	10.75
Prime Mover Heat Rate HHV (Btu/kWh)	**0**	**9,651**	**9,651**		10,073	10,073		10,601	10,601		9,651	9,651
Total Net Power Generation (kW)	**0**	**2,229**	**2,229**		4,379	4,379		1,764	1,764		2,229	2,229
Total Prime Mover Fuel Input HHV (MMBtu/hr)	**0.0**	**21.5**	**21.5**		44.1	44.1		18.7	18.7		21.5	21.5
Federal Investment Tax Credit (%)	**0%**	**10%**	**10%**		10%	10%		10%	10%		10%	10%
Steam Generation Technology	**0**	**HRSG**	**HRSG**		HRSG	HRSG		HRSG	HRSG		HRSG	HRSG
Number of Units	**0**	**2**	**2**		1	1		1	1		2	2
Steam Generation per Unit (lb/hr)	**0**	**2,231**	**2,231**		14,376	14,376		6,300	6,300		2,231	2,231
Total Steam Generation (lb/hr)	**0**	**4,462**	**4,462**		14,376	14,376		6,300	6,300		4,462	4,462
Total Project Capital Cost ($)	**$ -**	**$ 10,032,100**	**$ 10,032,100**		$ 16,488,500	$ 16,488,500		$ 11,972,800	$ 11,972,800		$ 10,032,100	$ 10,032,100
SGIP Incentive ($)	**$ -**	**$ (529,100)**	**$ (529,100)**		$ (875,000)	$ (875,000)		$ (691,000)	$ (691,000)		$ (529,100)	$ (529,100)
Investment Tax Credit ($)	**$ -**	**$ (1,003,200)**	**$ (1,003,200)**		$ (1,648,900)	$ (1,648,900)		$ (1,197,300)	$ (1,197,300)		$ (1,003,200)	$ (1,003,200)
Net Project Capital Cost ($)	**$ -**	**$ 8,499,800**	**$ 8,499,800**		$ 13,964,600	$ 13,964,600		$ 10,084,500	$ 10,084,500		$ 8,499,800	$ 8,499,800
Prime Mover Maintenance Cost ($/unit)	**$ -**	**$ 137,100**	**$ 137,100**		$ 430,900	$ 430,900		$ 301,500	$ 301,500		$ 137,100	$ 137,100
Number of Units	**0**	**2**	**2**		1	1		1	1		2	2
Total Prime Mover Maintenance Cost ($)	**$ -**	**$ 274,200**	**$ 274,200**		$ 430,900	$ 430,900		$ 301,500	$ 301,500		$ 274,200	$ 274,200
Additional Managers	**0**	**0**	**0**		0	0		0	0		0	0
Additional Operators	**0**	**0**	**0**		0	0		0	0		0	0
Additional Maintenance Techs.	**0**	**1**	**1**		1	1		1	1		1	1

2.0 GENERAL ASSUMPTIONS

Inflation Rate	2.00%
O&M Escalation Rate	3.00%
Labor Escalation Rate	2.00%
Debt Financed (%)	100.00%
Equity Financed (%)	0.00%
Discount Rate	15.00%
Debt Interest Rate	10.00%
Debt Term (years)	20.00
Marginal Tax Rate	40.00%
Depreciation	MACRS 5-Year
Manager Labor Rate ($/hr)	$ 100.00
Operator Labor Rate ($/hr)	$ 50.00
Maintenance Labor Rate ($/hr)	$ 50.00

2.1 MONTHLY ASSUMPTIONS

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
PG&E Natural Gas Rates												
Natural Gas Unit Fuel Price City Gate ($/MMBtu)	$6.37/MMBtu	$5.73/MMBtu	$5.15/MMBtu	$4.46/MMBtu	$4.52/MMBtu	$4.29/MMBtu	$4.66/MMBtu	$4.44/MMBtu	$3.63/MMBtu	$4.09/MMBtu	$3.96/MMBtu	$4.65/MMBtu
Transportation G-NR2 Up to 400 MMBtu ($/MMBtu)	$4.02/MMBtu	$4.02/MMBtu	$4.02/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$4.02/MMBtu	$4.02/MMBtu
Transportation G-NR2 Over 400 MMBtu ($/MMBtu)	$1.57/MMBtu	$1.57/MMBtu	$1.57/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.57/MMBtu	$1.57/MMBtu
Transporation G-EG ($/MMBtu)	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu
SMUD - GS TOU Rate [1]												
Super Peak Energy Rate ($/kWh)						$0.12030/kWh	$0.12030/kWh	$0.12030/kWh	$0.12030/kWh			
On Peak Energy Rate ($/kWh)	$0.08830/kWh	$0.08830/kWh	$0.08830/kWh	$0.08830/kWh	$0.08830/kWh	$0.10570/kWh	$0.10570/kWh	$0.10570/kWh	$0.10570/kWh	$0.08830/kWh	$0.08830/kWh	$0.08830/kWh
Off Peak Energy Rate ($/kWh)	$0.06990/kWh	$0.06990/kWh	$0.06990/kWh	$0.06990/kWh	$0.06990/kWh	$0.08630/kWh	$0.08630/kWh	$0.08630/kWh	$0.08630/kWh	$0.06990/kWh	$0.06990/kWh	$0.06990/kWh
SMUD - FIT Rate [2]												
Super Peak Energy Rate ($/kWh)	$0.06062/kWh	$0.06062/kWh	$0.05051/kWh	$0.05051/kWh	$0.05051/kWh	$0.22354/kWh	$0.22354/kWh	$0.22354/kWh	$0.22354/kWh	$0.06062/kWh	$0.06062/kWh	$0.06062/kWh
On Peak Energy Rate ($/kWh)	$0.05509/kWh	$0.05509/kWh	$0.04858/kWh	$0.04858/kWh	$0.04858/kWh	$0.05826/kWh	$0.05826/kWh	$0.05826/kWh	$0.05826/kWh	$0.05509/kWh	$0.05509/kWh	$0.05509/kWh
Off Peak Energy Rate ($/kWh)	$0.04334/kWh	$0.04334/kWh	$0.03740/kWh	$0.03740/kWh	$0.03740/kWh	$0.04992/kWh	$0.04992/kWh	$0.04992/kWh	$0.04992/kWh	$0.04334/kWh	$0.04334/kWh	$0.04334/kWh
Steam Enthalphy (Btu/lb)	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047
Existing Boiler Efficiency (%)	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%

2.2 ANNUAL ASSUMPTIONS

	2012	2013	2014 Year 1	2015 Year 2	2016 Year 3	2017 Year 4	2018 Year 5	2019 Year 6	2020 Year 7	2021 Year 8	2022 Year 9	2023 Year 10	2024 Year 11	2025 Year 12	2026 Year 13	2027 Year 14
PG&E Natural Gas Rates																
Natural Gas Unit Fuel Price City Gate ($/MMBtu) [3]	$4.66/MMBtu	$4.29/MMBtu	$3.31/MMBtu	$4.15/MMBtu	$4.55/MMBtu	$4.80/MMBtu	$5.03/MMBtu	$5.26/MMBtu	$5.50/MMBtu	$5.76/MMBtu	$6.01/MMBtu	$6.28/MMBtu	$6.56/MMBtu	$6.86/MMBtu	$7.16/MMBtu	$7.48/MMBtu
Escalation (%)		-8.04%	-22.76%	25.30%	9.64%	5.54%	4.74%	4.66%	4.58%	4.55%	4.48%	4.48%	4.48%	4.48%	4.48%	4.48%
Transportation G-NR2 ($/MMBtu) [4]	$1.63/MMBtu	$1.64/MMBtu	$1.66/MMBtu	$1.68/MMBtu	$1.69/MMBtu	$1.71/MMBtu	$1.73/MMBtu	$1.74/MMBtu	$1.76/MMBtu	$1.78/MMBtu	$1.80/MMBtu	$1.81/MMBtu	$1.83/MMBtu	$1.85/MMBtu	$1.87/MMBtu	$1.89/MMBtu
Transporation G-EG ($/MMBtu) [5]	$0.30/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.32/MMBtu	$0.32/MMBtu	$0.32/MMBtu	$0.33/MMBtu	$0.33/MMBtu	$0.33/MMBtu	$0.34/MMBtu	$0.34/MMBtu	$0.34/MMBtu	$0.35/MMBtu	$0.35/MMBtu
Escalation (%)		1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
SMUD - GS TOU Rate [6]																
Super Peak Energy Rate ($/kWh)	$0.12038/kWh	$0.12366/kWh	$0.12861/kWh	$0.13375/kWh	$0.13910/kWh	$0.14467/kWh	$0.15045/kWh	$0.15647/kWh	$0.16273/kWh	$0.16924/kWh	$0.17601/kWh	$0.18305/kWh	$0.19037/kWh	$0.19798/kWh	$0.20590/kWh	$0.21414/kWh
Escalation (%)		2.73%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%
On Peak Energy Rate ($/kWh)	$0.09113/kWh	$0.09362/kWh	$0.09736/kWh	$0.10126/kWh	$0.10531/kWh	$0.10952/kWh	$0.11390/kWh	$0.11845/kWh	$0.12319/kWh	$0.12812/kWh	$0.13325/kWh	$0.13857/kWh	$0.14412/kWh	$0.14988/kWh	$0.15588/kWh	$0.16211/kWh
Escalation (%)		2.73%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%
Off Peak Energy Rate ($/kWh)	$0.07567/kWh	$0.07774/kWh	$0.08085/kWh	$0.08408/kWh	$0.08744/kWh	$0.09094/kWh	$0.09458/kWh	$0.09836/kWh	$0.10230/kWh	$0.10639/kWh	$0.11064/kWh	$0.11507/kWh	$0.11967/kWh	$0.12446/kWh	$0.12944/kWh	$0.13461/kWh
Escalation (%)		2.73%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%
SMUD - FIT Rate [7]																
Super Peak Energy Rate ($/kWh)	$0.00000/kWh	$0.00000/kWh	$0.00000/kWh	$0.00000/kWh	$0.00000/kWh	$0.00000/kWh	$0.00000/kWh	$0.00000/kWh	$0.00000/kWh	$0.00000/kWh	$0.00000/kWh	$0.00000/kWh	$0.00000/kWh	$0.00000/kWh	$0.00000/kWh	$0.00000/kWh
Escalation (%)		2.58%	9.64%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%
On Peak Energy Rate ($/kWh)	$0.05358/kWh	$0.05476/kWh	$0.06004/kWh	$0.06106/kWh	$0.06210/kWh	$0.06316/kWh	$0.06423/kWh	$0.06532/kWh	$0.06643/kWh	$0.06756/kWh	$0.06871/kWh	$0.06988/kWh	$0.07107/kWh	$0.07227/kWh	$0.07350/kWh	$0.07475/kWh
Escalation (%)		2.21%	9.64%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%
Off Peak Energy Rate ($/kWh)	$0.04260/kWh	$0.04366/kWh	$0.04787/kWh	$0.04869/kWh	$0.04951/kWh	$0.05036/kWh	$0.05121/kWh	$0.05208/kWh	$0.05297/kWh	$0.05387/kWh	$0.05478/kWh	$0.05572/kWh	$0.05666/kWh	$0.05763/kWh	$0.05861/kWh	$0.05960/kWh
Escalation (%)		2.50%	9.64%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%
Steam Enthalph (Btu/lb)	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047
Existing Boiler Efficiency (%)	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%

[1] SMUD GS TOU GUT_L rates are based on Jan 1, 2012 rates.
[2] SMUD FIT Rates are based on rates approved for 2012 & 2013 as effective 1/1/2011.
[3] Based on historical correlation, City Gate natural gas price is estimated to be 8 percent higher than the Henry Hub monthly gas futures on Feb 22, 2012.
[4] Natural Gas Transportation G-NR2 rate is assumed for the existing boilers gas purchases.
[5] Natural Gas Transportation G-EG rate is assumed for the CHP gas purchases.
[6] SMUD - GS TOU rate escalation for 2013 is based on SMUD longterm forecast. Future prices are estimated to be 4 percent higher annually.
[7] SMUD - FIT rate for 2013 is based on average increases in SMUD FIT tariffs. Escalation beyond 2013 is based on FIT contract escalation rate of 1.70%.

3.0 MARKET ASSUMPTIONS

	2012	2013	2014 Year 1	2015 Year 2	2016 Year 3	2017 Year 4	2018 Year 5	2019 Year 6	2020 Year 7	2021 Year 8	2022 Year 9	2023 Year 10	2024 Year 11	2025 Year 12	2026 Year 13	2027 Year 14
Gas Price $/MMBtu [1]																
January	$6.37/MMBtu	$4.26/MMBtu	$3.52/MMBtu	$4.05/MMBtu	$4.63/MMBtu	$4.94/MMBtu	$5.17/MMBtu	$5.41/MMBtu	$5.67/MMBtu	$5.93/MMBtu	$6.20/MMBtu	$6.48/MMBtu	$6.77/MMBtu	$7.07/MMBtu	$7.39/MMBtu	$7.72/MMBtu
February	$5.73/MMBtu	$4.34/MMBtu	$3.19/MMBtu	$4.06/MMBtu	$4.62/MMBtu	$4.91/MMBtu	$5.14/MMBtu	$5.38/MMBtu	$5.64/MMBtu	$5.90/MMBtu	$6.17/MMBtu	$6.44/MMBtu	$6.73/MMBtu	$7.03/MMBtu	$7.35/MMBtu	$7.68/MMBtu
March	$5.15/MMBtu	$4.08/MMBtu	$2.85/MMBtu	$4.05/MMBtu	$4.56/MMBtu	$4.83/MMBtu	$5.06/MMBtu	$5.30/MMBtu	$5.55/MMBtu	$5.82/MMBtu	$6.08/MMBtu	$6.36/MMBtu	$6.64/MMBtu	$6.94/MMBtu	$7.25/MMBtu	$7.57/MMBtu
April	$4.46/MMBtu	$4.53/MMBtu	$3.00/MMBtu	$4.01/MMBtu	$4.41/MMBtu	$4.66/MMBtu	$4.87/MMBtu	$5.10/MMBtu	$5.33/MMBtu	$5.57/MMBtu	$5.81/MMBtu	$6.07/MMBtu	$6.34/MMBtu	$6.63/MMBtu	$6.93/MMBtu	$7.24/MMBtu
May	$4.52/MMBtu	$4.47/MMBtu	$3.11/MMBtu	$4.05/MMBtu	$4.42/MMBtu	$4.67/MMBtu	$4.88/MMBtu	$5.11/MMBtu	$5.34/MMBtu	$5.58/MMBtu	$5.82/MMBtu	$6.08/MMBtu	$6.36/MMBtu	$6.64/MMBtu	$6.94/MMBtu	$7.25/MMBtu
June	$4.29/MMBtu	$4.56/MMBtu	$3.21/MMBtu	$4.10/MMBtu	$4.45/MMBtu	$4.69/MMBtu	$4.91/MMBtu	$5.14/MMBtu	$5.36/MMBtu	$5.61/MMBtu	$5.85/MMBtu	$6.11/MMBtu	$6.39/MMBtu	$6.67/MMBtu	$6.97/MMBtu	$7.28/MMBtu
July	$4.66/MMBtu	$4.60/MMBtu	$3.29/MMBtu	$4.14/MMBtu	$4.49/MMBtu	$4.73/MMBtu	$4.95/MMBtu	$5.17/MMBtu	$5.40/MMBtu	$5.64/MMBtu	$5.89/MMBtu	$6.15/MMBtu	$6.43/MMBtu	$6.71/MMBtu	$7.02/MMBtu	$7.33/MMBtu
August	$4.44/MMBtu	$4.54/MMBtu	$3.33/MMBtu	$4.16/MMBtu	$4.51/MMBtu	$4.74/MMBtu	$4.97/MMBtu	$5.20/MMBtu	$5.43/MMBtu	$5.67/MMBtu	$5.92/MMBtu	$6.19/MMBtu	$6.47/MMBtu	$6.75/MMBtu	$7.06/MMBtu	$7.37/MMBtu
September	$3.63/MMBtu	$4.19/MMBtu	$3.34/MMBtu	$4.16/MMBtu	$4.51/MMBtu	$4.74/MMBtu	$4.97/MMBtu	$5.21/MMBtu	$5.44/MMBtu	$5.68/MMBtu	$5.94/MMBtu	$6.20/MMBtu	$6.48/MMBtu	$6.77/MMBtu	$7.07/MMBtu	$7.39/MMBtu
October	$4.09/MMBtu	$4.15/MMBtu	$3.40/MMBtu	$4.20/MMBtu	$4.55/MMBtu	$4.78/MMBtu	$5.01/MMBtu	$5.24/MMBtu	$5.49/MMBtu	$5.73/MMBtu	$6.00/MMBtu	$6.26/MMBtu	$6.54/MMBtu	$6.84/MMBtu	$7.14/MMBtu	$7.46/MMBtu
November	$3.96/MMBtu	$3.87/MMBtu	$3.59/MMBtu	$4.30/MMBtu	$4.63/MMBtu	$4.87/MMBtu	$5.10/MMBtu	$5.35/MMBtu	$5.60/MMBtu	$5.85/MMBtu	$6.12/MMBtu	$6.40/MMBtu	$6.68/MMBtu	$6.98/MMBtu	$7.29/MMBtu	$7.62/MMBtu
December	$4.65/MMBtu	$3.86/MMBtu	$3.90/MMBtu	$4.52/MMBtu	$4.83/MMBtu	$5.07/MMBtu	$5.31/MMBtu	$5.56/MMBtu	$5.82/MMBtu	$6.08/MMBtu	$6.35/MMBtu	$6.64/MMBtu	$6.93/MMBtu	$7.24/MMBtu	$7.57/MMBtu	$7.91/MMBtu
Average	$4.66/MMBtu	$4.29/MMBtu	$3.31/MMBtu	$4.15/MMBtu	$4.55/MMBtu	$4.80/MMBtu	$5.03/MMBtu	$5.26/MMBtu	$5.50/MMBtu	$5.76/MMBtu	$6.01/MMBtu	$6.28/MMBtu	$6.56/MMBtu	$6.86/MMBtu	$7.16/MMBtu	$7.48/MMBtu
		-8.04%	-22.76%	25.30%	9.64%	5.54%	4.74%	4.66%	4.58%	4.55%	4.48%	4.48%	4.48%	4.48%	4.48%	4.48%
On Peak Energy ($/MWh) [2]																
January	$66.91/MWh	$68.73/MWh	$68.65/MWh	$70.00/MWh	$73.36/MWh	$73.45/MWh	$75.18/MWh	$78.91/MWh	$80.39/MWh	$82.41/MWh	$83.88/MWh	$85.68/MWh	$86.77/MWh	$89.39/MWh	$91.89/MWh	$94.58/MWh
February	$65.84/MWh	$67.60/MWh	$64.98/MWh	$66.25/MWh	$69.43/MWh	$69.52/MWh	$71.16/MWh	$74.69/MWh	$76.09/MWh	$78.00/MWh	$79.39/MWh	$81.09/MWh	$82.13/MWh	$84.61/MWh	$86.97/MWh	$89.52/MWh
March	$64.20/MWh	$65.86/MWh	$62.39/MWh	$63.78/MWh	$66.85/MWh	$66.93/MWh	$68.50/MWh	$71.91/MWh	$73.25/MWh	$75.09/MWh	$76.43/MWh	$78.07/MWh	$79.07/MWh	$81.46/MWh	$83.73/MWh	$86.18/MWh
April	$56.60/MWh	$57.87/MWh	$55.16/MWh	$56.94/MWh	$59.67/MWh	$59.75/MWh	$61.15/MWh	$64.19/MWh	$65.39/MWh	$67.03/MWh	$68.23/MWh	$69.69/MWh	$70.58/MWh	$72.72/MWh	$74.74/MWh	$76.93/MWh
May	$57.86/MWh	$59.19/MWh	$54.87/MWh	$56.73/MWh	$59.46/MWh	$59.54/MWh	$60.93/MWh	$63.96/MWh	$65.16/MWh	$66.80/MWh	$67.99/MWh	$69.44/MWh	$70.33/MWh	$72.46/MWh	$74.48/MWh	$76.66/MWh
June	$60.83/MWh	$62.31/MWh	$58.99/MWh	$60.99/MWh	$63.91/MWh	$64.00/MWh	$65.50/MWh	$68.75/MWh	$70.04/MWh	$71.80/MWh	$73.08/MWh	$74.65/MWh	$75.60/MWh	$77.89/MWh	$80.06/MWh	$82.40/MWh
July	$76.24/MWh	$78.67/MWh	$70.73/MWh	$73.42/MWh	$76.94/MWh	$77.04/MWh	$78.85/MWh	$82.77/MWh	$84.32/MWh	$86.44/MWh	$87.98/MWh	$89.86/MWh	$91.02/MWh	$93.77/MWh	$96.38/MWh	$99.20/MWh
August	$76.29/MWh	$78.73/MWh	$72.01/MWh	$74.82/MWh	$78.42/MWh	$78.52/MWh	$80.36/MWh	$84.35/MWh	$85.94/MWh	$88.09/MWh	$89.66/MWh	$91.59/MWh	$92.76/MWh	$95.56/MWh	$98.22/MWh	$101.10/MWh
September	$69.87/MWh	$71.87/MWh	$67.10/MWh	$70.28/MWh	$73.66/MWh	$73.75/MWh	$75.48/MWh	$79.24/MWh	$80.72/MWh	$82.75/MWh	$84.22/MWh	$86.03/MWh	$87.13/MWh	$89.76/MWh	$92.26/MWh	$94.97/MWh
October	$66.81/MWh	$68.63/MWh	$64.14/MWh	$67.37/MWh	$70.61/MWh	$70.70/MWh	$72.36/MWh	$75.95/MWh	$77.38/MWh	$79.32/MWh	$80.73/MWh	$82.46/MWh	$83.52/MWh	$86.04/MWh	$88.44/MWh	$91.03/MWh
November	$67.34/MWh	$69.19/MWh	$65.26/MWh	$69.17/MWh	$72.49/MWh	$72.59/MWh	$74.29/MWh	$77.98/MWh	$79.45/MWh	$81.44/MWh	$82.89/MWh	$84.67/MWh	$85.75/MWh	$88.34/MWh	$90.81/MWh	$93.47/MWh
December	$68.45/MWh	$70.36/MWh	$67.19/MWh	$71.12/MWh	$74.53/MWh	$74.63/MWh	$76.38/MWh	$80.17/MWh	$81.68/MWh	$83.73/MWh	$85.22/MWh	$87.05/MWh	$88.16/MWh	$90.82/MWh	$93.36/MWh	$96.09/MWh
Average On Peak ($/MWh)	$66.44/MWh	$68.25/MWh	$64.29/MWh	$66.74/MWh	$69.94/MWh	$70.04/MWh	$71.68/MWh	$75.24/MWh	$76.65/MWh	$78.58/MWh	$79.98/MWh	$81.69/MWh	$82.74/MWh	$85.24/MWh	$87.61/MWh	$90.18/MWh
		2.73%	-5.81%	3.81%	4.80%	0.13%	2.35%	4.97%	1.87%	2.51%	1.78%	2.14%	1.28%	3.02%	2.79%	2.93%
Off Peak Energy ($/MWh) [2]																
January	$52.07/MWh	$53.62/MWh	$52.67/MWh	$53.71/MWh	$56.29/MWh	$56.36/MWh	$57.68/MWh	$60.55/MWh	$61.68/MWh	$63.23/MWh	$64.36/MWh	$65.74/MWh	$66.58/MWh	$68.59/MWh	$70.50/MWh	$72.57/MWh
February	$51.80/MWh	$53.33/MWh	$51.94/MWh	$52.96/MWh	$55.50/MWh	$55.57/MWh	$56.88/MWh	$59.70/MWh	$60.82/MWh	$62.35/MWh	$63.46/MWh	$64.82/MWh	$65.65/MWh	$67.64/MWh	$69.52/MWh	$71.56/MWh
March	$49.99/MWh	$51.40/MWh	$49.74/MWh	$50.85/MWh	$53.29/MWh	$53.36/MWh	$54.61/MWh	$57.33/MWh	$58.40/MWh	$59.87/MWh	$60.94/MWh	$62.24/MWh	$63.04/MWh	$64.94/MWh	$66.75/MWh	$68.71/MWh
April	$42.21/MWh	$43.18/MWh	$43.01/MWh	$44.39/MWh	$46.52/MWh	$46.58/MWh	$47.67/MWh	$50.04/MWh	$50.98/MWh	$52.26/MWh	$53.19/MWh	$54.33/MWh	$55.03/MWh	$56.69/MWh	$58.27/MWh	$59.97/MWh
May	$40.05/MWh	$40.91/MWh	$39.52/MWh	$40.87/MWh	$42.83/MWh	$42.89/MWh	$43.89/MWh	$46.07/MWh	$46.94/MWh	$48.12/MWh	$48.97/MWh	$50.02/MWh	$50.66/MWh	$52.19/MWh	$53.65/MWh	$55.22/MWh
June	$39.74/MWh	$40.59/MWh	$39.79/MWh	$41.14/MWh	$43.11/MWh	$43.17/MWh	$44.18/MWh	$46.38/MWh	$47.25/MWh	$48.43/MWh	$49.30/MWh	$50.35/MWh	$51.00/MWh	$52.54/MWh	$54.00/MWh	$55.59/MWh
July	$46.15/MWh	$47.33/MWh	$48.72/MWh	$50.58/MWh	$53.01/MWh	$53.08/MWh	$54.32/MWh	$57.02/MWh	$58.09/MWh	$59.55/MWh	$60.61/MWh	$61.91/MWh	$62.70/MWh	$64.59/MWh	$66.39/MWh	$68.34/MWh
August	$51.42/MWh	$52.92/MWh	$50.32/MWh	$52.28/MWh	$54.79/MWh	$54.86/MWh	$56.15/MWh	$58.94/MWh	$60.05/MWh	$61.56/MWh	$62.65/MWh	$63.99/MWh	$64.82/MWh	$66.77/MWh	$68.63/MWh	$70.64/MWh
September	$50.45/MWh	$51.89/MWh	$49.82/MWh	$52.19/MWh	$54.69/MWh	$54.76/MWh	$56.05/MWh	$58.83/MWh	$59.93/MWh	$61.44/MWh	$62.53/MWh	$63.87/MWh	$64.69/MWh	$66.65/MWh	$68.50/MWh	$70.51/MWh
October	$50.36/MWh	$51.79/MWh	$48.64/MWh	$51.09/MWh	$53.55/MWh	$53.62/MWh	$54.87/MWh	$57.60/MWh	$58.68/MWh	$60.15/MWh	$61.22/MWh	$62.54/MWh	$63.34/MWh	$65.25/MWh	$67.07/MWh	$69.03/MWh
November	$50.92/MWh	$52.39/MWh	$49.81/MWh	$52.80/MWh	$55.33/MWh	$55.41/MWh	$56.71/MWh	$59.52/MWh	$60.64/MWh	$62.16/MWh	$63.27/MWh	$64.63/MWh	$65.46/MWh	$67.43/MWh	$69.31/MWh	$71.34/MWh
December	$52.33/MWh	$53.90/MWh	$52.45/MWh	$55.51/MWh	$58.17/MWh	$58.25/MWh	$59.62/MWh	$62.58/MWh	$63.75/MWh	$65.35/MWh	$66.52/MWh	$67.94/MWh	$68.81/MWh	$70.89/MWh	$72.87/MWh	$75.00/MWh
Average Off Peak ($/MWh)	$48.12/MWh	$49.44/MWh	$48.04/MWh	$49.86/MWh	$52.26/MWh	$52.33/MWh	$53.55/MWh	$56.21/MWh	$57.27/MWh	$58.71/MWh	$59.75/MWh	$61.03/MWh	$61.82/MWh	$63.68/MWh	$65.46/MWh	$67.37/MWh
		2.73%	-2.84%	3.81%	4.80%	0.13%	2.35%	4.97%	1.87%	2.51%	1.78%	2.14%	1.28%	3.02%	2.79%	2.93%

[1] Source: Correlation to Henry Hub futures pricing.
[2] Source: SMUD forecast, prior study.

4.0 ELECTRIC LOAD SUMMARY

	January	February	March	April	May	June	July	August	September	October	November	December	Total
	31	28	31	30	31	30	31	31	30	31	30	31	365
Energy Consumption (kWh)	1,806,040	1,654,580	1,938,140	1,874,520	2,046,370	2,063,900	2,224,920	2,237,190	2,192,432	2,064,750	1,873,760	1,772,930	23,749,532
Peak Demand (kW)	3,104	3,148	3,331	3,329	3,430	3,763	3,822	3,845	3,894	3,549	3,328	3,047	3,894
Average Demand (kW)	2,427	2,462	2,605	2,604	2,750	2,867	2,990	3,007	3,045	2,775	2,602	2,383	2,710
Min Demand (kW)	1,751	1,776	1,879	1,878	2,071	1,970	2,159	2,169	2,196	2,002	1,877	1,719	1,719
Load Factor (%)	78.20%	78.20%	78.20%	78.20%	80.18%	76.17%	78.25%	78.20%	78.20%	78.20%	78.20%	78.20%	69.63%
Daytime Load (kW)	3,104	3,148	3,331	3,329	3,430	3,763	3,822	3,845	3,894	3,549	3,328	3,047	3,466
Daytime Energy (kWh)	1,154,715	1,057,877	1,239,175	1,198,499	1,276,086	1,354,729	1,421,617	1,430,376	1,401,760	1,320,125	1,198,013	1,133,546	15,186,516
Nighttime Load (kW)	1,751	1,776	1,879	1,878	2,071	1,970	2,159	2,169	2,196	2,002	1,877	1,719	1,954
Nighttime Energy (kWh)	651,325	596,703	698,965	676,021	770,284	709,171	803,303	806,814	790,672	744,625	675,747	639,384	8,563,016
Total Energy (kWh)	1,806,040	1,654,580	1,938,140	1,874,520	2,046,370	2,063,900	2,224,920	2,237,190	2,192,432	2,064,750	1,873,760	1,772,930	23,749,532

STEAM LOAD SUMMARY	January	February	March	April	May	June	July	August	September	October	November	December	Total
North Site													
North Natural Gas (Therms)	38,086	36,124	37,454	34,796	34,866	30,282	30,596	30,095	28,610	33,131	36,661	38,086	408,787
North Natural Gas (MMBtu)	3,809	3,612	3,745	3,480	3,487	3,028	3,060	3,010	2,861	3,313	3,666	3,809	40,879
Existing Boiler Efficiency (%)	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Steam Production (MMBtu)	3,237	3,071	3,184	2,958	2,964	2,574	2,601	2,558	2,432	2,816	3,116	3,237	34,747
Steam Enthalpy (Btu/lb)	**1,047**	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047
Steam Production (lbs)	3,091,979	2,932,695	3,040,711	2,824,898	2,830,573	2,458,400	2,483,948	2,443,275	2,322,668	2,689,702	2,976,266	3,091,979	33,187,093
South Site													
South Natural Gas (Therms)	88,867	84,289	87,394	81,191	81,354	70,657	71,392	70,223	66,756	77,305	85,541	88,867	953,836
South Natural Gas (MMBtu)	8,887	8,429	8,739	8,119	8,135	7,066	7,139	7,022	6,676	7,731	8,554	8,887	95,384
Existing Boiler Efficiency (%)	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Steam Production (MMBtu)	7,554	7,165	7,428	6,901	6,915	6,006	6,068	5,969	5,674	6,571	7,271	7,554	81,076
Steam Enthalpy (Btu/lb)	**1,147**	1,147	1,147	1,147	1,147	1,147	1,147	1,147	1,147	1,147	1,147	1,147	1,147
Steam Production (lbs)	6,585,618	6,246,359	6,476,422	6,016,762	6,028,849	5,236,156	5,290,572	5,203,942	4,947,059	5,728,807	6,339,162	6,585,618	70,685,326
Total Natural Gas (Therms)	126,953	120,413	124,848	115,987	116,220	100,939	101,988	100,318	95,366	110,436	122,202	126,953	1,362,623
Total Natural Gas (MMBtu)	12,695	12,041	12,485	11,599	11,622	10,094	10,199	10,032	9,537	11,044	12,220	12,695	136,262
Total Steam Demand (MMBtu)	10,791	10,235	10,612	9,859	9,879	8,580	8,669	8,527	8,106	9,387	10,387	10,791	115,823
Total Steam Demand (lbs)	9,677,596	9,179,054	9,517,133	8,841,661	8,859,422	7,694,555	7,774,520	7,647,217	7,269,727	8,418,509	9,315,429	9,677,596	103,872,419

4.1 CHP DISPATCH SUMMARY

	Electrical Dispatch					AMPAC Energy Sales - GS TOU Pricing				Grid Sales - FIT Pricing				Steam Production		
Month	Site Load (kWh)	South Generation (kWh)	North Generation (kWh)	Total Generation (kWh)	Grid Sales (kWh)	Site Load (kWh)	Super Peak (kWh)	On Peak (kWh)	Off Peak (kWh)	Grid Sales (kWh)	Super Peak (kWh)	On Peak (kWh)	Off Peak (kWh)	North Site (lbs)	South Site (lbs)	Total Site (lbs)
1	1,806,040	1,658,019	0	1,658,019	177,684	1,480,334	0	690,841	789,493	177,684	0	49,675	128,009	0	3,319,728	3,319,728
2	1,654,580	1,125,403	0	1,125,403	114,512	1,010,890	0	467,989	542,901	114,512	0	32,589	81,924	0	2,253,310	2,253,310
3	1,938,140	1,658,019	0	1,658,019	130,044	1,527,975	0	690,841	837,133	130,044	0	37,755	92,289	0	3,319,728	3,319,728
4	1,874,520	1,604,534	0	1,604,534	126,246	1,478,289	0	668,556	809,733	126,246	0	36,471	89,775	0	3,212,640	3,212,640
5	2,046,370	1,658,019	0	1,658,019	58,726	1,599,293	0	690,841	908,452	58,726	0	16,418	42,308	0	3,319,728	3,319,728
6	2,063,900	1,602,306	0	1,602,306	92,838	1,509,468	401,134	267,422	840,912	92,838	0	26,895	65,943	0	3,208,178	3,208,178
7	2,224,920	1,285,856	0	1,285,856	19,971	1,265,885	320,907	213,938	731,041	19,971	0	5,805	14,166	0	2,574,574	2,574,574
8	2,237,190	1,658,019	0	1,658,019	22,196	1,635,823	414,505	276,336	944,982	22,196	0	6,205	15,990	0	3,319,728	3,319,728
9	2,192,432	1,604,534	0	1,604,534	11,595	1,592,940	401,134	267,422	924,384	11,595	0	3,350	8,245	0	3,212,640	3,212,640
10	2,064,750	1,658,019	0	1,658,019	84,384	1,573,635	0	690,841	882,794	84,384	0	23,591	60,793	0	3,319,728	3,319,728
11	1,873,760	1,604,534	0	1,604,534	126,520	1,478,015	0	668,556	809,459	126,520	0	36,550	89,970	0	3,212,640	3,212,640
12	1,772,930	1,658,019	0	1,658,019	189,625	1,468,394	0	690,841	777,553	189,625	0	55,052	134,573	0	3,319,728	3,319,728
Total	23,749,532	18,775,281	0	18,775,281	1,154,340	17,620,941	1,537,679	6,284,426	9,798,835	1,154,340	0	330,355	823,985	0	37,592,350	37,592,350

5.0 MONTHLY ELECTRIC REVENUES

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2012
Electric Generation Capacity													
North CHP Plant Generation Capacity (kW)	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Generation Capacity (kW)	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229
Total Generation Capacity (kW)	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229
Electric Generation Energy													
North CHP Plant Generation (kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Generation (kWh)	1,658,019	1,125,403	1,658,019	1,604,534	1,658,019	1,602,306	1,285,856	1,658,019	1,604,534	1,658,019	1,604,534	1,658,019	18,775,281
Total CHP Plant Generation (kWh)	1,658,019	1,125,403	1,658,019	1,604,534	1,658,019	1,602,306	1,285,856	1,658,019	1,604,534	1,658,019	1,604,534	1,658,019	18,775,281
Total Energy Sales													
AMPAC Energy Sales (kWh)	1,480,334	1,010,890	1,527,975	1,478,289	1,599,293	1,509,468	1,265,885	1,635,823	1,592,940	1,573,635	1,478,015	1,468,394	17,620,941
SMUD Grid Energy Sales (kWh)	177,684	114,512	130,044	126,246	58,726	92,838	19,971	22,196	11,595	84,384	126,520	189,625	1,154,340
Total CHP Plant Generation (kWh)	1,658,019	1,125,403	1,658,019	1,604,534	1,658,019	1,602,306	1,285,856	1,658,019	1,604,534	1,658,019	1,604,534	1,658,019	18,775,281
AMPAC Energy Sales													
Super Peak Energy Sales (kWh)	0	0	0	0	0	401,134	320,907	414,505	401,134	0	0	0	1,537,679
On Peak Energy Sales (kWh)	690,841	467,989	690,841	668,556	690,841	267,422	213,938	276,336	267,422	690,841	668,556	690,841	6,284,426
Off Peak Energy Sales (kWh)	789,493	542,901	837,133	809,733	908,452	840,912	731,041	944,982	924,384	882,794	809,459	777,553	9,798,835
AMPAC Energy Sales (kWh)	1,480,334	1,010,890	1,527,975	1,478,289	1,599,293	1,509,468	1,265,885	1,635,823	1,592,940	1,573,635	1,478,015	1,468,394	17,620,941
SMUD - GS TOU Rate													
Super Peak Energy Rate ($/kWh)	$ -	$ -	$ -	$ -	$ -	$ 0.1203	$ 0.1203	$ 0.1203	$ 0.1203	$ -	$ -	$ -	$ 0.1204
On Peak Energy Rate ($/kWh)	$ 0.0883	$ 0.0883	$ 0.0883	$ 0.0883	$ 0.0883	$ 0.1057	$ 0.1057	$ 0.1057	$ 0.1057	$ 0.0883	$ 0.0883	$ 0.0883	$ 0.0911
Off Peak Energy Rate ($/kWh)	$ 0.0699	$ 0.0699	$ 0.0699	$ 0.0699	$ 0.0699	$ 0.0863	$ 0.0863	$ 0.0863	$ 0.0863	$ 0.0699	$ 0.0699	$ 0.0699	$ 0.0757
AMPAC Energy Revenues													
Super Peak Energy Revenues ($)	$ -	$ -	$ -	$ -	$ -	$ 48,300	$ 38,600	$ 49,900	$ 48,300	$ -	$ -	$ -	$ 185,100
On Peak Energy Revenues ($)	$ 61,000	$ 41,300	$ 61,000	$ 59,000	$ 61,000	$ 28,300	$ 22,600	$ 29,200	$ 28,300	$ 61,000	$ 59,000	$ 61,000	$ 572,700
Off Peak Energy Revenues ($)	$ 55,200	$ 37,900	$ 58,500	$ 56,600	$ 63,500	$ 72,600	$ 63,100	$ 81,600	$ 79,800	$ 61,700	$ 56,600	$ 54,400	$ 741,500
AMPAC Energy Revenues ($)	$ 116,200	$ 79,200	$ 119,500	$ 115,600	$ 124,500	$ 149,200	$ 124,300	$ 160,700	$ 156,400	$ 122,700	$ 115,600	$ 115,400	$ 1,499,300
SMUD Grid Energy Sales													
Super Peak Energy Sales (kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0
On Peak Energy Sales (kWh)	49,675	32,589	37,755	36,471	16,418	26,895	5,805	6,205	3,350	23,591	36,550	55,052	330,355
Off Peak Energy Sales (kWh)	128,009	81,924	92,289	89,775	42,308	65,943	14,166	15,990	8,245	60,793	89,970	134,573	823,985
SMUD Grid Energy Sales (kWh)	177,684	114,512	130,044	126,246	58,726	92,838	19,971	22,196	11,595	84,384	126,520	189,625	1,154,340
SMUD - FIT Rate													
Super Peak Energy Rate ($/kWh)	$ 0.0606	$ 0.0606	$ 0.0505	$ 0.0505	$ 0.0505	$ 0.2235	$ 0.2235	$ 0.2235	$ 0.2235	$ 0.0606	$ 0.0606	$ 0.0606	$ -
On Peak Energy Rate ($/kWh)	$ 0.0551	$ 0.0551	$ 0.0486	$ 0.0486	$ 0.0486	$ 0.0583	$ 0.0583	$ 0.0583	$ 0.0583	$ 0.0551	$ 0.0551	$ 0.0551	$ 0.0536
Off Peak Energy Rate ($/kWh)	$ 0.0433	$ 0.0433	$ 0.0374	$ 0.0374	$ 0.0374	$ 0.0499	$ 0.0499	$ 0.0499	$ 0.0499	$ 0.0433	$ 0.0433	$ 0.0433	$ 0.0426
SMUD Grid Energy Revenues													
Super Peak Energy Revenues ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
On Peak Energy Revenues ($)	$ 2,700	$ 1,800	$ 1,800	$ 1,800	$ 800	$ 1,600	$ 300	$ 400	$ 200	$ 1,300	$ 2,000	$ 3,000	$ 17,700
Off Peak Energy Revenues ($)	$ 5,500	$ 3,600	$ 3,500	$ 3,400	$ 1,600	$ 3,300	$ 700	$ 800	$ 400	$ 2,600	$ 3,900	$ 5,800	$ 35,100
SMUD Grid Energy Revenues ($)	$ 8,200	$ 5,400	$ 5,300	$ 5,200	$ 2,400	$ 4,900	$ 1,000	$ 1,200	$ 600	$ 3,900	$ 5,900	$ 8,800	$ 52,800
Total CHP Plant Energy Revenues													
AMPAC Energy Revenues ($)	$ 116,200	$ 79,200	$ 119,500	$ 115,600	$ 124,500	$ 149,200	$ 124,300	$ 160,700	$ 156,400	$ 122,700	$ 115,600	$ 115,400	$ 1,499,300
SMUD Grid Energy Revenues ($)	$ 8,200	$ 5,400	$ 5,300	$ 5,200	$ 2,400	$ 4,900	$ 1,000	$ 1,200	$ 600	$ 3,900	$ 5,900	$ 8,800	$ 52,800
Total Energy Revenues ($)	$ 124,400	$ 84,600	$ 124,800	$ 120,800	$ 126,900	$ 154,100	$ 125,300	$ 161,900	$ 157,000	$ 126,600	$ 121,500	$ 124,200	$ 1,552,100

5.1 ANNUAL ELECTRIC REVENUES

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
			Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
Electric Generation Capacity																
North CHP Plant Generation Capacity (kW)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Generation Capacity (kW)	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229
Total Generation Capacity (kW)	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229
Electric Generation Energy																
North CHP Plant Generation (kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Generation (kWh)	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281
Total CHP Plant Generation (kWh)	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281
Total Energy Sales																
AMPAC Energy Sales (kWh)	17,620,941	17,620,941	17,620,941	17,620,941	17,620,941	17,620,941	17,620,941	17,620,941	17,620,941	17,620,941	17,620,941	17,620,941	17,620,941	17,620,941	17,620,941	17,620,941
SMUD Grid Energy Sales (kWh)	1,154,340	1,154,340	1,154,340	1,154,340	1,154,340	1,154,340	1,154,340	1,154,340	1,154,340	1,154,340	1,154,340	1,154,340	1,154,340	1,154,340	1,154,340	1,154,340
Total CHP Plant Generation (kWh)	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281
AMPAC Energy Sales																
Super Peak Energy Sales (kWh)	1,537,679	1,537,679	1,537,679	1,537,679	1,537,679	1,537,679	1,537,679	1,537,679	1,537,679	1,537,679	1,537,679	1,537,679	1,537,679	1,537,679	1,537,679	1,537,679
On Peak Energy Sales (kWh)	6,284,426	6,284,426	6,284,426	6,284,426	6,284,426	6,284,426	6,284,426	6,284,426	6,284,426	6,284,426	6,284,426	6,284,426	6,284,426	6,284,426	6,284,426	6,284,426
Off Peak Energy Sales (kWh)	9,798,835	9,798,835	9,798,835	9,798,835	9,798,835	9,798,835	9,798,835	9,798,835	9,798,835	9,798,835	9,798,835	9,798,835	9,798,835	9,798,835	9,798,835	9,798,835
AMPAC Energy Sales (kWh)	17,620,941	17,620,941	17,620,941	17,620,941	17,620,941	17,620,941	17,620,941	17,620,941	17,620,941	17,620,941	17,620,941	17,620,941	17,620,941	17,620,941	17,620,941	17,620,941
SMUD - GS TOU Rate																
Super Peak Energy Rate ($/kWh)	$ 0.1204	$ 0.1237	$ 0.1286	$ 0.1338	$ 0.1391	$ 0.1447	$ 0.1505	$ 0.1565	$ 0.1627	$ 0.1692	$ 0.1760	$ 0.1830	$ 0.1904	$ 0.1980	$ 0.2059	$ 0.2141
On Peak Energy Rate ($/kWh)	$ 0.0911	$ 0.0936	$ 0.0974	$ 0.1013	$ 0.1053	$ 0.1095	$ 0.1139	$ 0.1185	$ 0.1232	$ 0.1281	$ 0.1332	$ 0.1386	$ 0.1441	$ 0.1499	$ 0.1559	$ 0.1621
Off Peak Energy Rate ($/kWh)	$ 0.0757	$ 0.0777	$ 0.0808	$ 0.0841	$ 0.0874	$ 0.0909	$ 0.0946	$ 0.0984	$ 0.1023	$ 0.1064	$ 0.1106	$ 0.1151	$ 0.1197	$ 0.1245	$ 0.1294	$ 0.1346
AMPAC Energy Revenues																
Super Peak Energy Revenues ($)	$ 185,100	$ 190,100	$ 197,800	$ 205,700	$ 213,900	$ 222,400	$ 231,300	$ 240,600	$ 250,200	$ 260,200	$ 270,600	$ 281,500	$ 292,700	$ 304,400	$ 316,600	$ 329,300
On Peak Energy Revenues ($)	$ 572,700	$ 588,300	$ 611,900	$ 636,300	$ 661,800	$ 688,300	$ 715,800	$ 744,400	$ 774,200	$ 805,200	$ 837,400	$ 870,900	$ 905,700	$ 941,900	$ 979,600	$ 1,018,800
Off Peak Energy Revenues ($)	$ 741,500	$ 761,700	$ 792,200	$ 823,900	$ 856,800	$ 891,100	$ 926,800	$ 963,800	$ 1,002,400	$ 1,042,500	$ 1,084,200	$ 1,127,500	$ 1,172,600	$ 1,219,500	$ 1,268,300	$ 1,319,100
AMPAC Energy Revenues ($)	$ 1,499,300	$ 1,540,100	$ 1,601,900	$ 1,665,900	$ 1,732,500	$ 1,801,800	$ 1,873,900	$ 1,948,800	$ 2,026,800	$ 2,107,900	$ 2,192,200	$ 2,279,900	$ 2,371,000	$ 2,465,800	$ 2,564,500	$ 2,667,200
SMUD Grid Energy Sales																
Super Peak Energy Sales (kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
On Peak Energy Sales (kWh)	330,355	330,355	330,355	330,355	330,355	330,355	330,355	330,355	330,355	330,355	330,355	330,355	330,355	330,355	330,355	330,355
Off Peak Energy Sales (kWh)	823,985	823,985	823,985	823,985	823,985	823,985	823,985	823,985	823,985	823,985	823,985	823,985	823,985	823,985	823,985	823,985
SMUD Grid Energy Sales (kWh)	1,154,340	1,154,340	1,154,340	1,154,340	1,154,340	1,154,340	1,154,340	1,154,340	1,154,340	1,154,340	1,154,340	1,154,340	1,154,340	1,154,340	1,154,340	1,154,340
SMUD - FIT Rate																
Super Peak Energy Rate ($/kWh)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
On Peak Energy Rate ($/kWh)	$ 0.0536	$ 0.0548	$ 0.0600	$ 0.0611	$ 0.0621	$ 0.0632	$ 0.0642	$ 0.0653	$ 0.0664	$ 0.0676	$ 0.0687	$ 0.0699	$ 0.0711	$ 0.0723	$ 0.0735	$ 0.0748
Off Peak Energy Rate ($/kWh)	$ 0.0426	$ 0.0437	$ 0.0479	$ 0.0487	$ 0.0495	$ 0.0504	$ 0.0512	$ 0.0521	$ 0.0530	$ 0.0539	$ 0.0548	$ 0.0557	$ 0.0567	$ 0.0576	$ 0.0586	$ 0.0596
SMUD Grid Energy Revenues																
Super Peak Energy Revenues ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
On Peak Energy Revenues ($)	$ 17,700	$ 18,100	$ 19,800	$ 20,200	$ 20,500	$ 20,900	$ 21,200	$ 21,600	$ 21,900	$ 22,300	$ 22,700	$ 23,100	$ 23,500	$ 23,900	$ 24,300	$ 24,700
Off Peak Energy Revenues ($)	$ 35,100	$ 36,000	$ 39,400	$ 40,100	$ 40,800	$ 41,500	$ 42,200	$ 42,900	$ 43,600	$ 44,400	$ 45,100	$ 45,900	$ 46,700	$ 47,500	$ 48,300	$ 49,100
SMUD Grid Energy Revenues ($)	$ 52,800	$ 54,100	$ 59,200	$ 60,300	$ 61,300	$ 62,400	$ 63,400	$ 64,500	$ 65,500	$ 66,700	$ 67,800	$ 69,000	$ 70,200	$ 71,400	$ 72,600	$ 73,800
Total CHP Plant Energy Revenues																
AMPAC Energy Revenues ($)	$ 1,499,300	$ 1,540,100	$ 1,601,900	$ 1,665,900	$ 1,732,500	$ 1,801,800	$ 1,873,900	$ 1,948,800	$ 2,026,800	$ 2,107,900	$ 2,192,200	$ 2,279,900	$ 2,371,000	$ 2,465,800	$ 2,564,500	$ 2,667,200
SMUD Grid Energy Revenues ($)	$ 52,800	$ 54,100	$ 59,200	$ 60,300	$ 61,300	$ 62,400	$ 63,400	$ 64,500	$ 65,500	$ 66,700	$ 67,800	$ 69,000	$ 70,200	$ 71,400	$ 72,600	$ 73,800
Total Energy Revenues ($)	$ 1,552,100	$ 1,594,200	$ 1,661,100	$ 1,726,200	$ 1,793,800	$ 1,864,200	$ 1,937,300	$ 2,013,300	$ 2,092,300	$ 2,174,600	$ 2,260,000	$ 2,348,900	$ 2,441,200	$ 2,537,200	$ 2,637,100	$ 2,741,000

6.0 MONTHLY STEAM REVENUES

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2010
Steam Generation Capacity													
North CHP Plant Generation Capacity (lbs/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Generation Capacity (lbs/hr)	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462
Total Generation Capacity (lbs/hr)	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462
Steam Generation													
North CHP Plant Steam Generation (lbs)	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Steam Generation (lbs)	3,319,728	2,253,310	3,319,728	3,212,640	3,319,728	3,208,178	2,574,574	3,319,728	3,212,640	3,319,728	3,212,640	3,319,728	37,592,350
Total CHP Plant Steam Generation (lbs)	3,319,728	2,253,310	3,319,728	3,212,640	3,319,728	3,208,178	2,574,574	3,319,728	3,212,640	3,319,728	3,212,640	3,319,728	37,592,350
North CHP Plant Steam Revenues													
North CHP Plant Steam Generation (lbs)	0	0	0	0	0	0	0	0	0	0	0	0	0
Steam Enthalpy (Btu/lb)	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047
North CHP Plant Steam Generation (MMBtu)	0	0	0	0	0	0	0	0	0	0	0	0	0
Existing Boiler Efficiency (%)	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Natural Gas Fuel Units (MMBtu)	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural Gas Unit Fuel Price City Gate ($/MMBtu)	$6.37/MMBtu	$5.73/MMBtu	$5.15/MMBtu	$4.46/MMBtu	$4.52/MMBtu	$4.29/MMBtu	$4.66/MMBtu	$4.44/MMBtu	$3.63/MMBtu	$4.09/MMBtu	$3.96/MMBtu	$4.65/MMBtu	$0.00/MMBtu
North CHP Plant Steam Revenue - Gas Credit ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Natural Gas Fuel Units (MMBtu)	0	0	0	0	0	0	0	0	0	0	0	0	0
Transportation G-NR2 Up to 400 MMBtu ($/MMBtu)	$4.02/MMBtu	$4.02/MMBtu	$4.02/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$4.02/MMBtu	$4.02/MMBtu	
Transportation G-NR2 Over 400 MMBtu ($/MMBtu)	$1.57/MMBtu	$1.57/MMBtu	$1.57/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.57/MMBtu	$1.57/MMBtu	
Transportation G-NR2 Average ($/MMBtu)	$1.81/MMBtu	$1.91/MMBtu	$1.81/MMBtu	$1.49/MMBtu	$1.47/MMBtu	$1.49/MMBtu	$1.55/MMBtu	$1.47/MMBtu	$1.49/MMBtu	$1.47/MMBtu	$1.82/MMBtu	$1.81/MMBtu	$0.00/MMBtu
North CHP Plant Steam Revenue - Gas Trans Credit ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
North CHP Plant Steam Generation (lbs)	0	0	0	0	0	0	0	0	0	0	0	0	0
North CHP Plant Steam Revenue ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
North CHP Plant Steam Revenue ($/1000 lb)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
South CHP Plant Steam Revenues													
South CHP Plant Steam Generation (lbs)	3,319,728	2,253,310	3,319,728	3,212,640	3,319,728	3,208,178	2,574,574	3,319,728	3,212,640	3,319,728	3,212,640	3,319,728	37,592,350
Steam Enthalpy (Btu/lb)	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047
South CHP Plant Steam Generation (MMBtu)	3,476	2,359	3,476	3,364	3,476	3,359	2,696	3,476	3,364	3,476	3,364	3,476	39,359
Existing Boiler Efficiency (%)	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Natural Gas Fuel Units (MMBtu)	4,089	2,776	4,089	3,957	4,089	3,952	3,171	4,089	3,957	4,089	3,957	4,089	46,305
Natural Gas Unit Fuel Price City Gate ($/MMBtu)	$6.37/MMBtu	$5.73/MMBtu	$5.15/MMBtu	$4.46/MMBtu	$4.52/MMBtu	$4.29/MMBtu	$4.66/MMBtu	$4.44/MMBtu	$3.63/MMBtu	$4.09/MMBtu	$3.96/MMBtu	$4.65/MMBtu	$4.64/MMBtu
South CHP Plant Steam Revenue - Gas Credit ($)	$ 26,000	$ 15,900	$ 21,100	$ 17,600	$ 18,500	$ 17,000	$ 14,800	$ 18,200	$ 14,400	$ 16,700	$ 15,700	$ 19,000	$ 214,900
Natural Gas Fuel Units (MMBtu)	4,089	2,776	4,089	3,957	4,089	3,952	3,171	4,089	3,957	4,089	3,957	4,089	46,305
Transportation G-NR2 Up to 400 MMBtu ($/MMBtu)	$4.02/MMBtu	$4.02/MMBtu	$4.02/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$3.28/MMBtu	$4.02/MMBtu	$4.02/MMBtu	
Transportation G-NR2 Over 400 MMBtu ($/MMBtu)	$1.57/MMBtu	$1.57/MMBtu	$1.57/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.28/MMBtu	$1.57/MMBtu	$1.57/MMBtu	
Transportation G-NR2 Average ($/MMBtu)	$1.81/MMBtu	$1.91/MMBtu	$1.81/MMBtu	$1.49/MMBtu	$1.47/MMBtu	$1.49/MMBtu	$1.55/MMBtu	$1.47/MMBtu	$1.49/MMBtu	$1.47/MMBtu	$1.82/MMBtu	$1.81/MMBtu	$1.63/MMBtu
South CHP Plant Steam Revenue - Gas Trans. Credit ($)	$ 7,400	$ 5,300	$ 7,400	$ 5,900	$ 6,000	$ 5,900	$ 4,900	$ 6,000	$ 5,900	$ 6,000	$ 7,200	$ 7,400	$ 75,300
South CHP Plant Steam Generation (lbs)	3,319,728	2,253,310	3,319,728	3,212,640	3,319,728	3,208,178	2,574,574	3,319,728	3,212,640	3,319,728	3,212,640	3,319,728	37,592,350
South CHP Plant Steam Revenue ($)	$ 33,400	$ 21,200	$ 28,500	$ 23,500	$ 24,500	$ 22,900	$ 19,700	$ 24,200	$ 20,300	$ 22,700	$ 22,900	$ 26,400	$ 290,200
South CHP Plant Steam Revenue ($/1000 lb)	$ 10.0611	$ 9.4084	$ 8.5850	$ 7.3149	$ 7.3801	$ 7.1380	$ 7.6518	$ 7.2898	$ 6.3188	$ 6.8379	$ 7.1281	$ 7.9525	$ 7.7197
Total CHP Plant Steam Revenues													
North CHP Plant Steam Revenue ($)	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Steam Revenue ($)	$ 33,400	$ 21,200	$ 28,500	$ 23,500	$ 24,500	$ 22,900	$ 19,700	$ 24,200	$ 20,300	$ 22,700	$ 22,900	$ 26,400	$ 290,200
Total CHP Plant Steam Revenue ($)	$ 33,400	$ 21,200	$ 28,500	$ 23,500	$ 24,500	$ 22,900	$ 19,700	$ 24,200	$ 20,300	$ 22,700	$ 22,900	$ 26,400	$ 290,200

6.1 ANNUAL STEAM REVENUES

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
			Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
Steam Generation Capacity																
North CHP Plant Generation Capacity (lbs/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Generation Capacity (lbs/hr)	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462
Total Generation Capacity (lbs/hr)	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462
Steam Generation																
North CHP Plant Steam Generation (lbs)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Steam Generation (lbs)	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350
Total CHP Plant Steam Generation (lbs)	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350
North CHP Plant Steam Revenues																
North CHP Plant Steam Generation (lbs)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Steam Enthalpy (Btu/lb)	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047
North CHP Plant Steam Generation (MMBtu)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Existing Boiler Efficiency (%)	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Natural Gas Fuel Units (MMBtu)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural Gas Unit Fuel Price City Gate ($/MMBtu)	$4.66/MMBtu	$4.29/MMBtu	$3.31/MMBtu	$4.15/MMBtu	$4.55/MMBtu	$4.80/MMBtu	$5.03/MMBtu	$5.26/MMBtu	$5.50/MMBtu	$5.76/MMBtu	$6.01/MMBtu	$6.28/MMBtu	$6.56/MMBtu	$6.86/MMBtu	$7.16/MMBtu	$7.48/MMBtu
North CHP Plant Steam Revenue - Gas Credit ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Natural Gas Fuel Units (MMBtu)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transportation G-NR2 Average ($/MMBtu)	$1.63/MMBtu	$1.64/MMBtu	$1.66/MMBtu	$1.68/MMBtu	$1.69/MMBtu	$1.71/MMBtu	$1.73/MMBtu	$1.74/MMBtu	$1.76/MMBtu	$1.78/MMBtu	$1.80/MMBtu	$1.81/MMBtu	$1.83/MMBtu	$1.85/MMBtu	$1.87/MMBtu	$1.89/MMBtu
North CHP Plant Steam Revenue - Gas Trans Credit ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
North CHP Plant Steam Generation (lbs)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North CHP Plant Steam Revenue ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
North CHP Plant Steam Revenue ($/1000 lb)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
South CHP Plant Steam Revenues																
South CHP Plant Steam Generation (lbs)	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350
Steam Enthalpy (Btu/lb)	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047
South CHP Plant Steam Generation (MMBtu)	39,359	39,359	39,359	39,359	39,359	39,359	39,359	39,359	39,359	39,359	39,359	39,359	39,359	39,359	39,359	39,359
Existing Boiler Efficiency (%)	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Natural Gas Fuel Units (MMBtu)	46,305	46,305	46,305	46,305	46,305	46,305	46,305	46,305	46,305	46,305	46,305	46,305	46,305	46,305	46,305	46,305
Natural Gas Unit Fuel Price City Gate ($/MMBtu)	$4.66/MMBtu	$4.29/MMBtu	$3.31/MMBtu	$4.15/MMBtu	$4.55/MMBtu	$4.80/MMBtu	$5.03/MMBtu	$5.26/MMBtu	$5.50/MMBtu	$5.76/MMBtu	$6.01/MMBtu	$6.28/MMBtu	$6.56/MMBtu	$6.86/MMBtu	$7.16/MMBtu	$7.48/MMBtu
South CHP Plant Steam Revenue - Gas Credit ($)	$ 214,900	198,500	153,400	192,200	210,700	222,300	232,900	243,700	254,900	266,500	278,400	290,900	303,900	317,500	331,700	346,600
Natural Gas Fuel Units (MMBtu)	46,305	46,305	46,305	46,305	46,305	46,305	46,305	46,305	46,305	46,305	46,305	46,305	46,305	46,305	46,305	46,305
Transportation G-NR2 Average ($/MMBtu)	$1.63/MMBtu	$1.64/MMBtu	$1.66/MMBtu	$1.68/MMBtu	$1.69/MMBtu	$1.71/MMBtu	$1.73/MMBtu	$1.74/MMBtu	$1.76/MMBtu	$1.78/MMBtu	$1.80/MMBtu	$1.81/MMBtu	$1.83/MMBtu	$1.85/MMBtu	$1.87/MMBtu	$1.89/MMBtu
South CHP Plant Steam Revenue - Gas Trans. Credit ($)	$ 75,300	76,100	76,800	77,600	78,400	79,100	79,900	80,700	81,500	82,400	83,200	84,000	84,800	85,700	86,600	87,400
South CHP Plant Steam Generation (lbs)	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350	37,592,350
South CHP Plant Steam Revenue ($)	$ 290,200	$ 274,600	$ 230,200	$ 269,800	$ 289,100	$ 301,400	$ 312,800	$ 324,400	$ 336,400	$ 348,900	$ 361,600	$ 374,900	$ 388,700	$ 403,200	$ 418,300	$ 434,000
South CHP Plant Steam Revenue ($/1000 lb)	$ 7.7197	$ 7.3047	$ 6.1236	$ 7.1770	$ 7.6904	$ 8.0176	$ 8.3208	$ 8.6294	$ 8.9486	$ 9.2811	$ 9.6190	$ 9.9728	$ 10.3399	$ 10.7256	$ 11.1273	$ 11.5449
Total CHP Plant Steam Revenues																
North CHP Plant Steam Revenue ($)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Steam Revenue ($)	$ 290,200	$ 274,600	$ 230,200	$ 269,800	$ 289,100	$ 301,400	$ 312,800	$ 324,400	$ 336,400	$ 348,900	$ 361,600	$ 374,900	$ 388,700	$ 403,200	$ 418,300	$ 434,000
Total CHP Plant Steam Revenue ($)	$ 290,200	$ 274,600	$ 230,200	$ 269,800	$ 289,100	$ 301,400	$ 312,800	$ 324,400	$ 336,400	$ 348,900	$ 361,600	$ 374,900	$ 388,700	$ 403,200	$ 418,300	$ 434,000

6.0a ANNUAL WASTE DISPOSAL REVENUES

Total CHP Plant Waste Disposal Revenues [1]																
North CHP Plant Waste Disposal Revenue ($)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Waste Disposal Revenue ($)	$ 2,146,000	$ 2,188,900	$ 2,232,700	$ 2,277,400	$ 2,322,900	$ 2,369,400	$ 2,416,800	$ 2,465,100	$ 2,514,400	$ 2,564,700	$ 2,616,000	$ 2,668,300	$ 2,721,700	$ 2,776,100	$ 2,831,600	$ 2,888,200
Total CHP Plant Waste Disposal Revenue ($)	$ 2,146,000	$ 2,188,900	$ 2,232,700	$ 2,277,400	$ 2,322,900	$ 2,369,400	$ 2,416,800	$ 2,465,100	$ 2,514,400	$ 2,564,700	$ 2,616,000	$ 2,668,300	$ 2,721,700	$ 2,776,100	$ 2,831,600	$ 2,888,200

[1] Estimated to be $2,146,000 annually, inflatted at 2.0% per year.

7.0 MONTHLY PRODUCTION COSTS

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2012
Electric Generation Capacity													
North CHP Plant Generation Capacity (kW)	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Generation Capacity (kW)	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229
Total Generation Capacity (kW)	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229
Electric Generation Energy													
North CHP Plant Generation (kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Generation (kWh)	1,658,019	1,125,403	1,658,019	1,604,534	1,658,019	1,602,306	1,285,856	1,658,019	1,604,534	1,658,019	1,604,534	1,658,019	18,775,281
Total CHP Plant Generation (kWh)	1,658,019	1,125,403	1,658,019	1,604,534	1,658,019	1,602,306	1,285,856	1,658,019	1,604,534	1,658,019	1,604,534	1,658,019	18,775,281
North CHP Plant Production Costs													
North CHP Plant Generation Capacity (kW)	0	0	0	0	0	0	0	0	0	0	0	0	0
North CHP Plant Generation (kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0
North CHP Plant Heat Rate HHV (Btu/kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0
North CHP Plant Fuel Use HHV (MMBtu)	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural Gas Unit Fuel Price City Gate ($/MMBtu)	$6.37/MMBtu	$5.73/MMBtu	$5.15/MMBtu	$4.46/MMBtu	$4.52/MMBtu	$4.29/MMBtu	$4.66/MMBtu	$4.44/MMBtu	$3.63/MMBtu	$4.09/MMBtu	$3.96/MMBtu	$4.65/MMBtu	$0.00/MMBtu
North CHP Plant Natural Gas Fuel Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0
North CHP Plant Fuel Use HHV (MMBtu)	0	0	0	0	0	0	0	0	0	0	0	0	0
Transportation G-EG ($/MMBtu)	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.00/MMBtu
North CHP Plant Natural Gas Transportation Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0
Total North CHP Plant Natural Gas Use (MMBtu)	0	0	0	0	0	0	0	0	0	0	0	0	0
Total North CHP Plant Natural Gas Fuel Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total North CHP Plant Natural Gas Fuel Cost ($/MMBtu)													
South CHP Plant Production Costs													
South CHP Plant Generation Capacity (kW)	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229
South CHP Plant Generation (kWh)	1,658,019	1,125,403	1,658,019	1,604,534	1,658,019	1,602,306	1,285,856	1,658,019	1,604,534	1,658,019	1,604,534	1,658,019	18,775,281
South CHP Plant Heat Rate HHV (Btu/kWh)	9,651	9,651	9,651	9,651	9,651	9,651	9,651	9,651	9,651	9,651	9,651	9,651	9,651
GROSS South CHP Plant Fuel Use HHV (MMBtu)	16,001	10,861	16,001	15,485	16,001	15,464	12,410	16,001	15,485	16,001	15,485	16,001	181,198
Maximum Waste to Fuel Natural Gas Offset (MMBtu)	12,648	11,424	12,648	12,240	12,648	12,240	12,648	12,648	12,240	12,648	12,240	12,648	148,920
NET South CHP Plant Fuel Use HHV (MMBtu)	3,353	0	3,353	3,245	3,353	3,224	0	3,353	3,245	3,353	3,245	3,353	33,079
Natural Gas Unit Fuel Price City Gate ($/MMBtu)	$6.37/MMBtu	$5.73/MMBtu	$5.15/MMBtu	$4.46/MMBtu	$4.52/MMBtu	$4.29/MMBtu	$4.66/MMBtu	$4.44/MMBtu	$3.63/MMBtu	$4.09/MMBtu	$3.96/MMBtu	$4.65/MMBtu	$4.57/MMBtu
South CHP Plant Natural Gas Fuel Cost ($)	$ 21,400	$ -	$ 17,300	$ 14,500	$ 15,200	$ 13,800	$ -	$ 14,900	$ 11,800	$ 13,700	$ 12,900	$ 15,600	151,100
South CHP Plant Fuel Use HHV (MMBtu)	3,353	0	3,353	3,245	3,353	3,224	0	3,353	3,245	3,353	3,245	3,353	33,079
Transportation G-EG ($/MMBtu)	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.30/MMBtu
South CHP Plant Natural Gas Transportation Cost ($)	$ 1,000	$ -	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ -	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 10,000
Total South CHP Plant Natural Gas Use (MMBtu)	3,353	0	3,353	3,245	3,353	3,224	0	3,353	3,245	3,353	3,245	3,353	33,079
Total South CHP Plant Natural Gas Fuel Cost ($)	$ 22,400	$ -	$ 18,300	$ 15,500	$ 16,200	$ 14,800	$ -	$ 15,900	$ 12,800	$ 14,700	$ 13,900	$ 16,600	$ 161,100
Total South CHP Plant Natural Gas Fuel Cost ($/MMBtu)	$6.68/MMBtu		$5.46/MMBtu	$4.78/MMBtu	$4.83/MMBtu	$4.59/MMBtu		$4.74/MMBtu	$3.94/MMBtu	$4.38/MMBtu	$4.28/MMBtu	$4.95/MMBtu	$4.87/MMBtu
Total CHP Plant Production Costs													
Total Natural Gas Fuel Use (MMBtu)	3,353	0	3,353	3,245	3,353	3,224	0	3,353	3,245	3,353	3,245	3,353	33,079
Total Natural Gas Fuel Cost ($)	$ 22,400	$ -	$ 18,300	$ 15,500	$ 16,200	$ 14,800	$ -	$ 15,900	$ 12,800	$ 14,700	$ 13,900	$ 16,600	$ 161,100
Total Natural Gas Fuel Cost ($/MMBtu)	$6.68/MMBtu		$5.46/MMBtu	$4.78/MMBtu	$4.83/MMBtu	$4.59/MMBtu		$4.74/MMBtu	$3.94/MMBtu	$4.38/MMBtu	$4.28/MMBtu	$4.95/MMBtu	$4.87/MMBtu

7.1 ANNUAL PRODUCTION COSTS

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
			Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
Electric Generation Capacity																
North CHP Plant Generation Capacity (kW)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Generation Capacity (kW)	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229
Total Generation Capacity (kW)	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229
Electric Generation Energy																
North CHP Plant Generation (kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South CHP Plant Generation (kWh)	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281
Total CHP Plant Generation (kWh)	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281
North CHP Plant Production Costs																
North CHP Plant Generation Capacity (kW)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North CHP Plant Generation (kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North CHP Plant Heat Rate HHV (Btu/kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North CHP Plant Fuel Use HHV (MMBtu)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural Gas Unit Fuel Price City Gate ($/MMBtu)	$4.66/MMBtu	$4.29/MMBtu	$3.31/MMBtu	$4.15/MMBtu	$4.55/MMBtu	$4.80/MMBtu	$5.03/MMBtu	$5.26/MMBtu	$5.50/MMBtu	$5.76/MMBtu	$6.01/MMBtu	$6.28/MMBtu	$6.56/MMBtu	$6.86/MMBtu	$7.16/MMBtu	$7.48/MMBtu
North CHP Plant Natural Gas Fuel Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
North CHP Plant Fuel Use HHV (MMBtu)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transportation G-EG ($/MMBtu)	$0.30/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.32/MMBtu	$0.32/MMBtu	$0.32/MMBtu	$0.33/MMBtu	$0.33/MMBtu	$0.33/MMBtu	$0.34/MMBtu	$0.34/MMBtu	$0.34/MMBtu	$0.35/MMBtu	$0.35/MMBtu
North CHP Plant Natural Gas Transportation Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total North CHP Plant Natural Gas Use (MMBtu)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total North CHP Plant Natural Gas Fuel Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total North CHP Plant Natural Gas Fuel Cost ($/MMBtu)																
South CHP Plant Production Costs																
South CHP Plant Generation Capacity (kW)	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229	2,229
South CHP Plant Generation (kWh)	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281	18,775,281
South CHP Plant Heat Rate HHV (Btu/kWh)	9,651	9,651	9,651	9,651	9,651	9,651	9,651	9,651	9,651	9,651	9,651	9,651	9,651	9,651	9,651	9,651
South CHP Plant Fuel Use HHV (MMBtu)	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079
Natural Gas Unit Fuel Price City Gate ($/MMBtu)	$4.57/MMBtu	$4.29/MMBtu	$3.31/MMBtu	$4.15/MMBtu	$4.55/MMBtu	$4.80/MMBtu	$5.03/MMBtu	$5.26/MMBtu	$5.50/MMBtu	$5.76/MMBtu	$6.01/MMBtu	$6.28/MMBtu	$6.56/MMBtu	$6.86/MMBtu	$7.16/MMBtu	$7.48/MMBtu
South CHP Plant Natural Gas Fuel Cost ($)	$ 151,100	$ 141,800	$ 109,600	$ 137,300	$ 150,500	$ 158,800	$ 166,400	$ 174,100	$ 182,100	$ 190,400	$ 198,900	$ 207,800	$ 217,100	$ 226,800	$ 237,000	$ 247,600
South CHP Plant Fuel Use HHV (MMBtu)	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079
Transportation G-EG ($/MMBtu)	$0.30/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.31/MMBtu	$0.32/MMBtu	$0.32/MMBtu	$0.32/MMBtu	$0.33/MMBtu	$0.33/MMBtu	$0.33/MMBtu	$0.34/MMBtu	$0.34/MMBtu	$0.34/MMBtu	$0.35/MMBtu	$0.35/MMBtu
South CHP Plant Natural Gas Transportation Cost ($)	$ 10,000	$ 10,100	$ 10,200	$ 10,300	$ 10,400	$ 10,500	$ 10,600	$ 10,700	$ 10,800	$ 10,900	$ 11,000	$ 11,200	$ 11,300	$ 11,400	$ 11,500	$ 11,600
Total South CHP Plant Natural Gas Use (MMBtu)	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079
Total South CHP Plant Natural Gas Fuel Cost ($)	$ 161,100	$ 151,900	$ 119,800	$ 147,600	$ 160,900	$ 169,300	$ 177,000	$ 184,800	$ 192,900	$ 201,300	$ 209,900	$ 219,000	$ 228,400	$ 238,200	$ 248,500	$ 259,200
Total South CHP Plant Natural Gas Fuel Cost ($/MMBtu)	$4.87/MMBtu	$4.59/MMBtu	$3.62/MMBtu	$4.46/MMBtu	$4.86/MMBtu	$5.12/MMBtu	$5.35/MMBtu	$5.59/MMBtu	$5.83/MMBtu	$6.09/MMBtu	$6.35/MMBtu	$6.62/MMBtu	$6.90/MMBtu	$7.20/MMBtu	$7.51/MMBtu	$7.84/MMBtu
Total CHP Plant Production Costs																
Total Natural Gas Fuel Use (MMBtu)	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079	33,079
Total Natural Gas Fuel Cost ($)	$ 161,100	$ 151,900	$ 119,800	$ 147,600	$ 160,900	$ 169,300	$ 177,000	$ 184,800	$ 192,900	$ 201,300	$ 209,900	$ 219,000	$ 228,400	$ 238,200	$ 248,500	$ 259,200
Total Natural Gas Fuel Cost ($/MMBtu)	$4.87/MMBtu	$4.59/MMBtu	$3.62/MMBtu	$4.46/MMBtu	$4.86/MMBtu	$5.12/MMBtu	$5.35/MMBtu	$5.59/MMBtu	$5.83/MMBtu	$6.09/MMBtu	$6.35/MMBtu	$6.62/MMBtu	$6.90/MMBtu	$7.20/MMBtu	$7.51/MMBtu	$7.84/MMBtu

8.0 OPERATION AND MAINTENANCE COSTS

	2012	2013	2014 Year 1	2015 Year 2	2016 Year 3	2017 Year 4	2018 Year 5	2019 Year 6	2020 Year 7	2021 Year 8	2022 Year 9	2023 Year 10	2024 Year 11	2025 Year 12	2026 Year 13	2027 Year 14
Incremental Labor Costs																
Management (Qty)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Burdened Hourly Rate ($/hr)	$ 100.00	$ 102.00	$ 104.04	$ 106.12	$ 108.24	$ 110.41	$ 112.62	$ 114.87	$ 117.17	$ 119.51	$ 121.90	$ 124.34	$ 126.82	$ 129.36	$ 131.95	$ 134.59
Escalation (%)	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Management Labor Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Additional Operators (Qty)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Burdened Hourly Rate ($/hr)	$ 50.00	$ 51.00	$ 52.02	$ 53.06	$ 54.12	$ 55.20	$ 56.31	$ 57.43	$ 58.58	$ 59.75	$ 60.95	$ 62.17	$ 63.41	$ 64.68	$ 65.97	$ 67.29
Escalation (%)	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Operator Labor Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Additional Maintenance Techs (Qty)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Burdened Hourly Rate ($/hr)	$ 50.00	$ 51.00	$ 52.02	$ 53.06	$ 54.12	$ 55.20	$ 56.31	$ 57.43	$ 58.58	$ 59.75	$ 60.95	$ 62.17	$ 63.41	$ 64.68	$ 65.97	$ 67.29
Escalation (%)	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Maintenance Techs Labor Cost ($)	$ 104,000	$ 106,100	$ 108,200	$ 110,400	$ 112,600	$ 114,800	$ 117,100	$ 119,500	$ 121,900	$ 124,300	$ 126,800	$ 129,300	$ 131,900	$ 134,500	$ 137,200	$ 140,000
Total Additional Labor Cost ($)	$ 104,000	$ 106,100	$ 108,200	$ 110,400	$ 112,600	$ 114,800	$ 117,100	$ 119,500	$ 121,900	$ 124,300	$ 126,800	$ 129,300	$ 131,900	$ 134,500	$ 137,200	$ 140,000
North Plant CHP Maintenance Cost																
Number of Units	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Prime Mover Maintenance Cost ($/unit)	$ 137,100	$ 141,200	$ 145,400	$ 149,800	$ 154,300	$ 158,900	$ 163,700	$ 168,600	$ 173,700	$ 178,900	$ 184,300	$ 189,800	$ 195,500	$ 201,400	$ 207,400	$ 213,600
Escalation (%)	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
Total Prime Mover Maintenance Cost ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
South Plant CHP Maintenance Cost																
Number of Units	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Prime Mover Maintenance Cost ($/unit)	$ 137,100	$ 141,200	$ 145,400	$ 149,800	$ 154,300	$ 158,900	$ 163,700	$ 168,600	$ 173,700	$ 178,900	$ 184,300	$ 189,800	$ 195,500	$ 201,400	$ 207,400	$ 213,600
Escalation (%)	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
Total Prime Mover Maintenance Cost ($)	$ 274,200	$ 282,400	$ 290,800	$ 299,600	$ 308,600	$ 317,800	$ 327,400	$ 337,200	$ 347,400	$ 357,800	$ 368,600	$ 379,600	$ 391,000	$ 402,800	$ 414,800	$ 427,200
Total Additional Maintenance Cost ($)	$ 274,200	$ 282,400	$ 290,800	$ 299,600	$ 308,600	$ 317,800	$ 327,400	$ 337,200	$ 347,400	$ 357,800	$ 368,600	$ 379,600	$ 391,000	$ 402,800	$ 414,800	$ 427,200

9.0 FINANCING

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
			Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
Financing Assumptions																
Debt Term (years)	20.00															
Interest Rate	10.00%															
Investment Tax Credit	10%															
Capital Cost	$ 10,032,100															
Less SGIP Incentive	$ (529,100)															
Less Tax Credit	$ (1,003,200)															
Financed Amount	$ 8,499,800															
Debt Financed	100.00%															
Equity Financed	0.00%															
Total Debt Financing	$ 8,499,800															
Total Equity Financing	$ -															
Long Term Financing																
Interest Rate			10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%
Amount to Finance			$ 8,499,800													
Beginning Year Balance			$ 8,499,800	$ 8,351,400	$ 8,188,100	$ 8,008,500	$ 7,811,000	$ 7,593,700	$ 7,354,700	$ 7,091,800	$ 6,802,600	$ 6,484,500	$ 6,134,600	$ 5,749,700	$ 5,326,300	$ 4,860,500
Interest			$ 850,000	$ 835,100	$ 818,800	$ 800,900	$ 781,100	$ 759,400	$ 735,500	$ 709,200	$ 680,300	$ 648,500	$ 613,500	$ 575,000	$ 532,600	$ 486,100
Principal			$ 148,400	$ 163,300	$ 179,600	$ 197,500	$ 217,300	$ 239,000	$ 262,900	$ 289,200	$ 318,100	$ 349,900	$ 384,900	$ 423,400	$ 465,800	$ 512,300
Annual Debt Payment			$ 998,400	$ 998,400	$ 998,400	$ 998,400	$ 998,400	$ 998,400	$ 998,400	$ 998,400	$ 998,400	$ 998,400	$ 998,400	$ 998,400	$ 998,400	$ 998,400
End of Year Balance			$ 8,351,400	$ 8,188,100	$ 8,008,500	$ 7,811,000	$ 7,593,700	$ 7,354,700	$ 7,091,800	$ 6,802,600	$ 6,484,500	$ 6,134,600	$ 5,749,700	$ 5,326,300	$ 4,860,500	$ 4,348,200

10.0 DEPRECIATION

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
			Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
Capital Cost	$ 10,032,100															
Less SGIP Incentive	$ (529,100)															
Less Tax Credit	$ (1,003,200)															
Depreciable Basis [1]	$ 9,265,950															
Depreciation Method	MACRS 5-Year															
Depreciation Percentage			20.00%	32.00%	19.20%	11.52%	11.52%	5.76%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Depreciation Expense			$ 1,853,190	$ 2,965,104	$ 1,779,062	$ 1,067,437	$ 1,067,437	$ 533,719	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

[1] Depreciable Basis is equal to total project cost less the tax credits and rebate for which the project qualifies.

11.0 PRO FORMA

	2012	2013	2014 Year 1	2015 Year 2	2016 Year 3	2017 Year 4	2018 Year 5	2019 Year 6	2020 Year 7	2021 Year 8	2022 Year 9	2023 Year 10
INCOME STATEMENT												
Operating Revenues												
Electric Revenues	$ -	$ -	$ 1,661,100	$ 1,726,200	$ 1,793,800	$ 1,864,200	$ 1,937,300	$ 2,013,300	$ 2,092,300	$ 2,174,600	$ 2,260,000	$ 2,348,900
Steam Revenues	$ -	$ -	$ 230,200	$ 269,800	$ 289,100	$ 301,400	$ 312,800	$ 324,400	$ 336,400	$ 348,900	$ 361,600	$ 374,900
Waste Disposal Revenues	$ -	$ -	$ 2,232,700	$ 2,277,400	$ 2,322,900	$ 2,369,400	$ 2,416,800	$ 2,465,100	$ 2,514,400	$ 2,564,700	$ 2,616,000	$ 2,668,300
Total Operating Revenues	$ -	$ -	$ 4,124,000	$ 4,273,400	$ 4,405,800	$ 4,535,000	$ 4,666,900	$ 4,802,800	$ 4,943,100	$ 5,088,200	$ 5,237,600	$ 5,392,100
Operating Expenses												
Natural Gas Expenses	$ -	$ -	$ (119,800)	$ (147,600)	$ (160,900)	$ (169,300)	$ (177,000)	$ (184,800)	$ (192,900)	$ (201,300)	$ (209,900)	$ (219,000)
Additional Labor Expense	$ -	$ -	$ (108,200)	$ (110,400)	$ (112,600)	$ (114,800)	$ (117,100)	$ (119,500)	$ (121,900)	$ (124,300)	$ (126,800)	$ (129,300)
Additional Maintenance Expense	$ -	$ -	$ (290,800)	$ (299,600)	$ (308,600)	$ (317,800)	$ (327,400)	$ (337,200)	$ (347,400)	$ (357,800)	$ (368,600)	$ (379,600)
Total Operating Expenses			$ (518,800)	$ (557,600)	$ (582,100)	$ (601,900)	$ (621,500)	$ (641,500)	$ (662,200)	$ (683,400)	$ (705,300)	$ (727,900)
EBITDA	$ -	$ -	$ 3,605,200	$ 3,715,800	$ 3,823,700	$ 3,933,100	$ 4,045,400	$ 4,161,300	$ 4,280,900	$ 4,404,800	$ 4,532,300	$ 4,664,200
Non-Operating Expenses												
Interest Expense			$ (850,000)	$ (835,100)	$ (818,800)	$ (800,900)	$ (781,100)	$ (759,400)	$ (735,500)	$ (709,200)	$ (680,300)	$ (648,500)
Depreciation Expense			$ (1,853,190)	$ (2,965,104)	$ (1,779,062)	$ (1,067,437)	$ (1,067,437)	$ (533,719)	$ -	$ -	$ -	$ -
Total Non-Operating Expenses	$ -	$ -	$ (2,703,190)	$ (3,800,204)	$ (2,597,862)	$ (1,868,337)	$ (1,848,537)	$ (1,293,119)	$ (735,500)	$ (709,200)	$ (680,300)	$ (648,500)
EBT	$ -	$ -	$ 902,010	$ (84,404)	$ 1,225,838	$ 2,064,763	$ 2,196,863	$ 2,868,181	$ 3,545,400	$ 3,695,600	$ 3,852,000	$ 4,015,700
Taxes												
Investment Tax Credit	$ -	$ -	$ 1,003,200	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Federal and State Tax Shield (Tax Liability)	$ -	$ -	$ (360,800)	$ 33,800	$ (490,300)	$ (825,900)	$ (878,700)	$ (1,147,300)	$ (1,418,200)	$ (1,478,200)	$ (1,540,800)	$ (1,606,300)
Total Taxes	$ -	$ -	$ 642,400	$ 33,800	$ (490,300)	$ (825,900)	$ (878,700)	$ (1,147,300)	$ (1,418,200)	$ (1,478,200)	$ (1,540,800)	$ (1,606,300)
NET INCOME	$ -	$ -	$ 1,544,410	$ (50,604)	$ 735,538	$ 1,238,863	$ 1,318,163	$ 1,720,881	$ 2,127,200	$ 2,217,400	$ 2,311,200	$ 2,409,400
CASH FLOW STATEMENT												
Cash Flows Operating Activities												
Net Income	$ -	$ -	$ 1,544,410	$ (50,604)	$ 735,538	$ 1,238,863	$ 1,318,163	$ 1,720,881	$ 2,127,200	$ 2,217,400	$ 2,311,200	$ 2,409,400
Depreciation Expense	$ -	$ -	$ 1,853,190	$ 2,965,104	$ 1,779,062	$ 1,067,437	$ 1,067,437	$ 533,719	$ -	$ -	$ -	$ -
Net Cash Flows Operating Activities	$ -	$ -	$ 3,397,600	$ 2,914,500	$ 2,514,600	$ 2,306,300	$ 2,385,600	$ 2,254,600	$ 2,127,200	$ 2,217,400	$ 2,311,200	$ 2,409,400
Cash Flows Capital Financing and Investing Activities												
Proceeds From SGIP Rebate		$ 529,100										
Proceeds From Debt		$ 8,499,800										
Capital Acquisition Payments		$ (10,032,100)										
Principal Payments			$ (148,400)	$ (163,300)	$ (179,600)	$ (197,500)	$ (217,300)	$ (239,000)	$ (262,900)	$ (289,200)	$ (318,100)	$ (349,900)
Net Cash Flows Capital Financing and Investing Activities		$ (1,003,200)	$ (148,400)	$ (163,300)	$ (179,600)	$ (197,500)	$ (217,300)	$ (239,000)	$ (262,900)	$ (289,200)	$ (318,100)	$ (349,900)
Net Increase (Decrease) in Cash	$ -	$ (1,003,200)	$ 3,249,200	$ 2,751,200	$ 2,335,000	$ 2,108,800	$ 2,168,300	$ 2,015,600	$ 1,864,300	$ 1,928,200	$ 1,993,100	$ 2,059,500
Cumulative Positive Cash Flows												
Net Present Value		$ 13,939,700										
Discount Rate		**15.00%**										

APPENDIX C – PROCESS CHEMICAL STREAMS

Ampac Fine Chemicals
Combined Heat and Power Project
Hazardous Solvent and Aqueous Streams

ACC-261/278 Solvent

Chemical	Wt.	%
Heptane	18	41.9%
Ethanol	25	58.1%
Total Weight per Batch, kg	43	100.0%
Total Volume, L	57.3	
Total Volume, Gal	15.1	

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ACC-321/322 Solvent

Chemical	Wt.	%
Heptane	88	39.6%
Ethanol	134	60.4%
Total Weight per Batch, kg	222	100.0%
Total Volume, L	296.0	
Total Volume, Gal	78.2	

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NOTES

Mass balance does not account for cleaning or CSP regeneration, etc…
No aqueous waste streams produced by this process

Ampac Fine Chemicals
Combined Heat and Power Project
Hazardous Solvent and Aqueous Streams

ACC-262 Solvent

Chemical	Wt.	%
Acetone	5358.0	97.57%
Toluene	23.6	0.43%
Carbon	0.0	0.00%
Dicalite	0.0	0.00%
Water	0.0	0.00%
Monoalkylated ABA	0.0	0.00%
Dialkylated ABA	0.0	0.00%
ABA	0.0	0.00%
Others	0.0	0.00%
Hydroxypyridine	0.0	0.00%
LO59	109.6	2.00%
Ethanol	0.0	0.00%
Total Weight per Batch, kg	5491.23	100.00%
Stream Density, kg/L	0.79	
Total Volume, L	6782.28	
Total Volume, Gal	1791.88	

mb - ACC262-2006\ACC262 Mass Balance\mb-ACC262-R01 New Process.xls

NOTES

Mass balance does not account for cleaning
No aqueous waste streams produced by this process

Ampac Fine Chemicals
Combined Heat and Power Project
Hazardous Solvent and Aqueous Streams

ACC-308/324 Solvent @ 05063

Chemical	Wt.	%
other	2.50	0.1%
Methanol	2094.92	82.6%
Sodium Methoxide	20.00	0.8%
Etiracetam (50/50 of LO60/LO59)	418.98	16.5%
Total Weight per Batch, kg	2536.42	100.0%
Stream Density, kg/L	0.80	
Total Volume, L	3188.02	
Total Volume, Gal	842.28	

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ACC-308/324 05133

Chemical	Wt.	%
other	0.00	0.0%
Methanol	2299.66	79.6%
Sodium Methoxide	20.00	0.7%
Etiracetam (50/50 of LO60/LO59)	568.26	19.7%
Total Weight per Batch, kg	2887.92	100.0%
Stream Density, kg/L	0.98	
Total Volume, L	2951.73	
Total Volume, Gal	779.85	

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NOTES

Mass balance does not account for cleaning
No aqueous waste streams produced by this process

Ampac Fine Chemicals
Combined Heat and Power Project
Hazardous Solvent and Aqueous Streams

ACC-322 Solvent

Chemical	Wt.	%
Acetone	40.6	89.62%
Dicalite	4.7	10.38%
LO59		0.00%
Total Weight per Batch, kg	45.30	100.00%
Stream Density, kg/L	0.84	
Total Volume, L	53.65	
Total Volume, Gal	14.17	

mb-ACC322-Acetone Distillation 01-31-12.xls

NOTES

Acetone recycling of centrate. Only waste stream considered was from the dryer vent
Mass balance does not account for cleaning
No aqueous waste streams produced by this process

Ampac Fine Chemicals
Combined Heat and Power Project
Hazardous Solvent and Aqueous Streams

ACC-322 Acetone Recovery Solvent

Chemical	Wt.	%
Acetone	223.69	75.00%
LO59	74.56	25.00%
Total Weight per Batch, kg	298.26	100.00%
Stream Density, kg/L	0.83	
Total Volume, L	361.28	
Total Volume, Gal	95.44	

mb-ACC322-Acetone Distillation 01-31-12.xls

NOTES

Mass balance does not account for cleaning
No aqueous waste streams produced by this process

Ampac Fine Chemicals
Combined Heat and Power Project
Hazardous Solvent and Aqueous Streams

ACC-268 Solvent

Chemical	Wt.	%
Adenine, kg	1.95	0.0%
(R)-1,2-Propylene carbonate, kg	75.90	0.8%
Toluene, kg	3412.42	38.1%
Acetone, kg	765.86	6.7%
NaOH, kg	7.80	0.1%
Methanesulfonic Acid, kg	87.80	1.0%
Dimethylformamide (DMF), kg	2405.00	26.8%
HPA, kg	124.60	1.4%
Carbon Dioxide, kg	0.00	0.0%
Ethanol, kg	1949.29	21.8%
Other, kg	129.05	1.4%
Water	0.00	0.0%
Methanol	165.00	1.8%
Total Weight per Batch, kg	9124.67	100.0%
Stream Density, kg/L	0.86	
Total Volume, L	10610.08	
Total Volume, Gal	2803.19	

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NOTES

No viable aqueous waste streams produced by this process.

Ampac Fine Chemicals
Combined Heat and Power Project
Hazardous Solvent and Aqueous Streams

ACC-288 Solvent

Chemical	Wt.	%
Adenine, kg	0.00	0.0%
(R)-1,2-Propylene carbonate, kg	0.00	0.0%
Toluene, kg	406.18	9.9%
Acetone, kg	1050.00	25.6%
NaOH, kg	0.00	0.0%
Methanesulfonic Acid, kg	0.00	0.0%
Dimethylformamide (DMF), kg	624.26	15.2%
HPA, kg	0.25	0.0%
Carbon Dioxide, kg	0.00	0.0%
Magnesium t-butoxide, kg	2.13	0.1%
Tosylate Reagent, kg	5.04	0.1%
Mg(OTs)2, kg	15.42	0.4%
Diethyl PMPA, kg	0.58	0.0%
t-Butanol, kg	0.00	0.0%
Water, kg	176.08	4.3%
Hydrogen Bromide, kg	13.00	0.3%
Ethyl Bromide, kg	359.31	8.8%
Dimethylamine hydrobromide	1.13	0.0%
Carbon monoxide, kg	0.00	0.0%
t-butylbromide, kg	276.19	6.7%
Magnesium bromide, kg	1.53	0.0%
Ethyl Acetate, kg	1133.47	27.6%
Other (PMPA-HBr), kg	0.00	0.00
PMPA, kg	23.68	0.01
Sodium Bromide	15.42	0.00
Methanol	0.00	0.00
Total Weight per Batch, kg	4103.67	100.0%
Stream Density, kg/L	0.92	
Total Volume, L	4450.10	
Total Volume, Gal	1175.72	

ACC-288 Aqueous

Chemical	Wt.	%
Adenine, kg	0.00	0.0%
(R)-1,2-Propylene carbonate, kg	0.00	0.0%
Toluene, kg	1.32	0.0%
Acetone, kg	1081.41	5.7%
NaOH, kg	0.91	0.0%
Methanesulfonic Acid, kg	0.00	0.0%
Dimethylformamide (DMF), kg	55.69	0.3%
HPA, kg	4.70	0.0%
Carbon Dioxide, kg	0.00	0.0%
Magnesium t-butoxide, kg	40.50	0.2%
Tosylate Reagent, kg	79.70	0.4%
Mg(OTs)2, kg	293.03	1.6%
Diethyl PMPA, kg	10.97	0.1%
t-Butanol, kg	0.00	0.0%
Water, kg	16695.30	88.4%
Hydrogen Bromide, kg	0.00	0.0%
Ethyl Bromide, kg	0.00	0.0%
Dimethylamine hydrobromide	21.38	0.1%
Carbon monoxide, kg	0.00	0.0%
t-butylbromide, kg	0.00	0.0%
Magnesium bromide, kg	29.15	0.2%
Ethyl Acetate, kg	186.53	1.0%
Other (PMPA-HBr), kg	0.00	0.00
PMPA, kg	68.85	0.00
Sodium Bromide	314.08	0.02
Methanol	0.00	0.00
Total Weight per Batch, kg	18883.52	100.0%
Stream Density, kg/L	1.00	
Total Volume, L	18814.87	
Total Volume, Gal	4970.90	

Ampac Fine Chemicals
Combined Heat and Power Project
Hazardous Solvent and Aqueous Streams

ACC-289 Solvent

Chemical	Wt.	%
Acetone, kg	2695.00	12.05%
NaOH, kg	0.00	0.00%
Methanesulfonic Acid, kg	0.00	0.00%
Dimethylformamide (DMF), kg	0.00	0.00%
HPA, kg	0.00	0.00%
Carbon Dioxide, kg	0.00	0.00%
Magnesium t-butoxide, kg	0.00	0.00%
Tosylate Reagent, kg	0.00	0.00%
Mg(OTs)2, kg	0.00	0.00%
Diethyl PMPA, kg	0.00	0.00%
t-Butanol, kg	0.00	0.00%
Water, kg	46.68	0.21%
Bromotrimethylsilane, kg	0.00	0.00%
Hydrogen Bromide, kg	0.00	0.00%
Ethyl Bromide, kg	0.00	0.00%
Ethyl Acetate, kg	0.00	0.00%
((CH3)3Si)2O, kg	0.00	0.00%
TD + Other, kg	9.32	0.04%
PMPA, kg	0.00	0.00%
NMP (1-methyl-2-pyrrolidinone)	2071.89	9.27%
TEA, kg	257.65	1.15%
Chloromethyl-2-propylcarbonate, k	578.18	2.59%
Hydrogen Chloride, 37%	0.00	0.00%
Hydroxylamine (Freebase)	0.27	0.00%
N6-Hydroxymethyl	2.38	0.01%
Oxime	3.50	0.02%
Ammonium Acetate	1.31	0.01%
Magnesium Sulfate	0.00	0.00%
Isopropyl acetate, kg	7532.17	33.68%
Sodium Chloride, kg	2.68	0.01%
Fumaric acid, kg	88.01	0.39%
Silica gel, kg	0.00	0.00%
IPA, kg	2349.86	10.51%
PMPA-TEA Salt, kg	20.85	0.09%
Tenofovir DF, kg	53.85	0.24%
TEA-HCl, kg	0.00	0.00%
IsoPropyl ether, kg	6648.93	29.73%
CIP-100	0.00	0.00%
Total Weight per Batch, kg	22362.53	100.00%
Stream Density, kg/L	0.82	
Total Volume, L	27383.91	
Total Volume, Gal	7234.85	

ACC-289 Aqueous

Chemical	Wt.	%
Acetone, kg	0.00	0.00%
NaOH, kg	0.00	0.00%
Methanesulfonic Acid, kg	0.00	0.00%
Dimethylformamide (DMF), kg	0.00	0.00%
HPA, kg	0.00	0.00%
Carbon Dioxide, kg	0.00	0.00%
Magnesium t-butoxide, kg	0.00	0.00%
Tosylate Reagent, kg	0.00	0.00%
Mg(OTs)2, kg	0.00	0.00%
Diethyl PMPA, kg	0.00	0.00%
t-Butanol, kg	0.00	0.00%
Water, kg	11148.61	74.40%
Bromotrimethylsilane, kg	0.00	0.00%
Hydrogen Bromide, kg	0.00	0.00%
Ethyl Bromide, kg	0.00	0.00%
Ethyl Acetate, kg	0.00	0.00%
((CH3)3Si)2O, kg	0.00	0.00%
TD + Other, kg	76.88	0.51%
PMPA, kg	0.00	0.00%
NMP (1-methyl-2-pyrrolidinone)	1393.05	9.30%
TEA, kg	0.00	0.00%
Chloromethyl-2-propylcarbonate, kg	18.95	0.13%
Hydrogen Chloride, 37%	34.16	0.23%
Hydroxylamine (Freebase)	22.52	0.15%
N6-Hydroxymethyl	3.37	0.02%
Oxime	0.93	0.01%
Ammonium Acetate	648.39	4.33%
Magnesium Sulfate	365.00	2.44%
Isopropyl acetate, kg	144.33	0.96%
Sodium Chloride, kg	577.67	3.85%
Fumaric acid, kg	0.00	0.00%
Silica gel, kg	0.00	0.00%
IPA, kg	0.00	0.00%
PMPA-TEA Salt, kg	23.64	0.16%
Tenofovir DF, kg	0.00	0.00%
TEA-HCl, kg	527.48	3.52%
IsoPropyl ether, kg	0.00	0.00%
CIP-100	0.00	0.00%
Total Weight per Batch, kg	14984.96	100.00%
Stream Density, kg/L	1.04	
Total Volume, L	14394.30	
Total Volume, Gal	3802.99	

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Ampac Fine Chemicals
Combined Heat and Power Project
Hazardous Solvent and Aqueous Streams

ACC-289 IPE Recovery Solvent

Chemical	Wt.	%
Water, kg	0.08	0.02%
TD + Other, kg	0.03	0.01%
NMP (1-methyl-2-pyrrolidinone), kg	0.00	0.00%
Chloromethyl-2-propylcarbonate, kg	7.79	1.52%
Isopropyl acetate, kg	0.53	0.10%
Fumaric acid, kg	0.00	0.00%
IPA, kg	5.87	1.15%
Tenofovir DF, kg	0.00	0.00%
IsoPropyl ether, kg	497.01	97.15%
BHT (Butylhydroxytoluene), kg	0.27	0.05%
Total Weight per Batch, kg	511.58	100.00%
Stream Density, kg/L	0.73	
Total Volume, L	700.53	
Total Volume, Gal	185.08	

ACC-289 IPE Recovery Aqueous

Chemical	Wt.	%
Water, kg	22696.60	99.47%
TD + Other, kg	0.00	0.00%
NMP (1-methyl-2-pyrrolidinone), kg	1.73	0.34%
Chloromethyl-2-propylcarbonate, kg	0.00	0.00%
Isopropyl acetate, kg	0.00	0.00%
Fumaric acid, kg	2.13	0.42%
IPA, kg	51.09	9.99%
Tenofovir DF, kg	17.27	3.38%
IsoPropyl ether, kg	49.35	9.65%
BHT (Butylhydroxytoluene), kg	0.00	0.00%
Total Weight per Batch, kg	22818.17	4460.33%
Stream Density, kg/L	1.00	
Total Volume, L	22882.08	
Total Volume, Gal	6045.46	

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Ampac Fine Chemicals
Combined Heat and Power Project
Hazardous Solvent and Aqueous Streams

ACC-342.1 Solvent

Chemical	Wt.	%
INCB032182, Comp 3	0.00	0.00%
Potassium Carbonate,kg	0.00	0.00%
1-Butanol,kg	243.00	18.22%
Hydrochloric Acid, kg	0.00	0.00%
Potassium Borate?, kg	0.00	0.00%
Paladium catalyst,kg	0.00	0.00%
Water, kg	8.57	0.64%
Acetonitrile,kg	0.00	0.00%
4-Chloro (Compound 1)	0.00	0.00%
SEM-Cl (compound 2)	0.00	0.00%
Ethyl Acetate, kg	0.00	0.00%
NaOH, kg	0.00	0.00%
Charcoal	0.00	0.00%
Celite	0.00	0.00%
Dimethylacetamide DMAC	0.26	0.02%
Sodium Hydride,60%	0.00	0.00%
Sodium Chloride, kg	0.00	0.00%
WPT1710-225	0.00	0.00%
Tetrahydrofuran,kg	0.00	0.00%
INCB032304, Comp 5	0.00	0.00%
INCB032304*Phosphate	0.00	0.00%
Sodium Phosphate	0.00	0.00%
Pinacol,kg	0.00	0.00%
Acetaldehyde, kg	0.00	0.00%
Ethanol	0.00	0.00%
Methanol	299.39	22.44%
Potassium Chloride,kg	0.00	0.00%
paraformaldehyde,kg	0.67	0.05%
DBU*HCl	0.00	0.00%
Carbon Dioxide,kg	0.00	0.00%
DBU	0.00	0.00%
INCB032181, Comp 8	0.00	0.00%
INCB032309, Comp 9	0.00	0.00%
INCB032306, Comp 10R	0.00	0.00%
TBME,kg	779.23	58.41%
Heptane,kg	0.00	0.00%
Cesium Chloride, kg	0.00	0.00%
Isopropanol,kg	0.00	0.00%
Lithium Tetrafluoroborate	0.00	0.00%
Sodium Bicarbonate,kg	0.00	0.00%
Ammonium hydroxide,kg	0.00	0.00%
Cesium Carbonate,kg	0.00	0.00%
INCB018424, Comp 11	0.00	0.00%
INCB021499,kg	0.00	0.00%
85% Phosphoric acid,kg	0.00	0.00%
INCB018424 Phosphate	0.00	0.00%
Trimethylsilylethanol,kg	2.66	0.20%
Hydrogen	0.00	0.00%
pyrimidine sodium	0.00	0.00%
DCM, methylene chloride	0.00	0.00%
DME, Dimethoxyethane	0.00	0.00%
Mineral Oil	0.26	0.02%
Total Weight per Batch,kg	1334.04	100.00%
Stream Density, kg/L	0.76	
Total Volume, L	1744.57	
Total Volume, Gal	460.92	

ACC-342.1 Aqueous

Chemical	Wt.	%
INCB032182, Comp 3	19.46	1.00%
Potassium Carbonate,kg	0.00	0.00%
1-Butanol,kg	0.00	0.00%
Hydrochloric Acid, kg	0.00	0.00%
Potassium Borate?, kg	0.00	0.00%
Paladium catalyst,kg	0.00	0.00%
Water, kg	1108.92	57.15%
Acetonitrile,kg	0.00	0.00%
4-Chloro (Compound 1)	0.05	0.00%
SEM-Cl (compound 2)	0.00	0.00%
Ethyl Acetate, kg	0.00	0.00%
NaOH, kg	-0.22	-0.01%
Charcoal	0.00	0.00%
Celite	0.00	0.00%
Dimethylacetamide DMAC	480.85	24.78%
Sodium Hydride,60%	0.00	0.00%
Sodium Chloride, kg	195.10	10.06%
WPT1710-225	0.00	0.00%
Tetrahydrofuran,kg	0.00	0.00%
INCB032304, Comp 5	0.00	0.00%
INCB032304*Phosphate	0.00	0.00%
Sodium Phosphate	0.00	0.00%
Pinacol,kg	0.00	0.00%
Acetaldehyde, kg	0.00	0.00%
Ethanol	0.00	0.00%
Methanol	0.00	0.00%
Potassium Chloride,kg	0.00	0.00%
paraformaldehyde,kg	0.35	0.02%
DBU*HCl	0.00	0.00%
Carbon Dioxide,kg	0.00	0.00%
DBU	0.00	0.00%
INCB032181, Comp 8	0.00	0.00%
INCB032309, Comp 9	0.00	0.00%
INCB032306, Comp 10R	0.00	0.00%
TBME,kg	132.38	6.82%
Heptane,kg	0.00	0.00%
Cesium Chloride, kg	0.00	0.00%
Isopropanol,kg	0.00	0.00%
Lithium Tetrafluoroborate	0.00	0.00%
Sodium Bicarbonate,kg	0.00	0.00%
Ammonium hydroxide,kg	0.00	0.00%
Cesium Carbonate,kg	0.00	0.00%
INCB018424, Comp 11	0.00	0.00%
INCB021499,kg	0.00	0.00%
85% Phosphoric acid,kg	0.00	0.00%
INCB018424 Phosphate	0.00	0.00%
Trimethylsilylethanol,kg	1.36	0.07%
Hydrogen	0.00	0.00%
pyrimidine sodium	0.68	0.04%
DCM, methylene chloride	0.00	0.00%
DME, Dimethoxyethane	0.00	0.00%
Mineral Oil	1.28	0.07%
Total Weight per Batch,kg	1940.20	100.00%
Stream Density, kg/L	1.01	
Total Volume, L	1918.63	
Total Volume, Gal	506.90	

Ampac Fine Chemicals
Combined Heat and Power Project
Hazardous Solvent and Aqueous Streams

ACC-342.2 Solvent

Chemical	Wt.	%
INCB032183, WPT1710-212	0.00	0.00%
INCB032182, Comp 3	0.00	0.00%
Potassium Carbonate,kg	0.00	0.00%
1-Butanol,kg	305.20	17.61%
Hydrochloric Acid, kg	0.00	0.00%
Potassium Borate?, kg	0.00	0.00%
Paladium catalyst,kg	0.00	0.00%
Water, kg	325.90	18.81%
Acetonitrile,kg	1.57	0.09%
4-Chloro (Compound 1)	0.00	0.00%
SEM-Cl (compound 2)	0.00	0.00%
Ethyl Acetate, kg	782.73	45.17%
NaOH, kg	0.00	0.00%
Charcoal	0.00	0.00%
Celite	0.00	0.00%
Dimethylacetamide DMAC	0.00	0.00%
Sodium Hydride,60%	0.00	0.00%
Sodium Chloride, kg	0.00	0.00%
WPT1710-225	0.00	0.00%
Tetrahydrofuran,kg	0.00	0.00%
INCB032304, Comp 5	0.00	0.00%
INCB032304*Phosphate	0.00	0.00%
Sodium Phosphate	0.00	0.00%
Pinacol,kg	10.89	0.63%
Acetaldehyde, kg	0.00	0.00%
Ethanol	0.00	0.00%
Methanol	299.39	17.28%
Potassium Chloride,kg	0.00	0.00%
paraformaldehyde,kg	0.21	0.01%
DBU*HCl	0.00	0.00%
Carbon Dioxide,kg	0.00	0.00%
DBU	0.00	0.00%
INCB032181, Comp 8	0.00	0.00%
INCB032309, Comp 9	0.00	0.00%
INCB032306, Comp 10R	0.00	0.00%
TBME,kg	0.00	0.00%
Heptane,kg	0.02	0.00%
Cesium Chloride, kg	0.00	0.00%
Isopropanol,kg	0.00	0.00%
Lithium Tetrafluoroborate	0.00	0.00%
Sodium Bicarbonate,kg	0.00	0.00%
Ammonium hydroxide,kg	0.00	0.00%
Cesium Carbonate,kg	0.00	0.00%
INCB018424, Comp 11	0.00	0.00%
INCB021499,kg	0.00	0.00%
85% Phosphoric acid,kg	0.00	0.00%
INCB018424 Phosphate	0.00	0.00%
Trimethylsilylethanol,kg	5.63	0.32%
Hydrogen	0.00	0.00%
pyrimidine sodium	0.00	0.00%
DCM, methylene chloride	0.00	0.00%
DME, Dimethoxyethane	0.00	0.00%
Mineral Oil	1.27	0.07%
Total Weight per Batch,kg	1732.82	100.00%
Stream Density, kg/L	0.88	
Total Volume, L	1966.84	
Total Volume, Gal	519.64	

ACC-342.2 Aqueous

Chemical	Wt.	%
INCB032183, WPT1710-212	23.10	1.33%
INCB032182, Comp 3	0.80	0.05%
Potassium Carbonate,kg	39.75	2.29%
1-Butanol,kg	129.66	7.48%
Hydrochloric Acid, kg	0.00	0.00%
Potassium Borate?, kg	123.63	7.13%
Paladium catalyst,kg	0.00	0.00%
Water, kg	7296.38	421.07%
Acetonitrile,kg	677.84	39.12%
4-Chloro (Compound 1)	0.41	0.02%
SEM-Cl (compound 2)	0.00	0.00%
Ethyl Acetate, kg	285.18	16.46%
NaOH, kg	3.74	0.22%
Charcoal	0.00	0.00%
Celite	0.00	0.00%
Dimethylacetamide DMAC	0.08	0.00%
Sodium Hydride,60%	0.00	0.00%
Sodium Chloride, kg	127.72	7.37%
WPT1710-225	2.55	0.15%
Tetrahydrofuran,kg	276.74	15.97%
INCB032304, Comp 5	23.38	1.35%
INCB032304*Phosphate	0.00	0.00%
Sodium Phosphate	0.00	0.00%
Pinacol,kg	72.08	4.16%
Acetaldehyde, kg	30.63	1.77%
Ethanol	32.04	1.85%
Methanol	0.00	0.00%
Potassium Chloride,kg	99.73	5.76%
paraformaldehyde,kg	1.94	0.11%
DBU*HCl	0.00	0.00%
Carbon Dioxide,kg	0.00	0.00%
DBU	0.00	0.00%
INCB032181, Comp 8	0.00	0.00%
INCB032309, Comp 9	0.00	0.00%
INCB032306, Comp 10R	0.00	0.00%
TBME,kg	0.00	0.00%
Heptane,kg	938.38	54.15%
Cesium Chloride, kg	0.00	0.00%
Isopropanol,kg	0.00	0.00%
Lithium Tetrafluoroborate	0.00	0.00%
Sodium Bicarbonate,kg	0.00	0.00%
Ammonium hydroxide,kg	0.00	0.00%
Cesium Carbonate,kg	0.00	0.00%
INCB018424, Comp 11	0.00	0.00%
INCB021499,kg	0.00	0.00%
85% Phosphoric acid,kg	0.00	0.00%
INCB018424 Phosphate	0.00	0.00%
Trimethylsilylethanol,kg	5.69	0.33%
Hydrogen	0.00	0.00%
pyrimidine sodium	0.00	0.00%
DCM, methylene chloride	0.00	0.00%
DME, Dimethoxyethane	0.00	0.00%
Mineral Oil	11.49	0.66%
Total Weight per Batch,kg	10202.95	588.80%
Stream Density, kg/L	0.94	
Total Volume, L	10797.50	
Total Volume, Gal	2852.71	

Ampac Fine Chemicals
Combined Heat and Power Project
Hazardous Solvent and Aqueous Streams

ACC-342.3 Solvent

Chemical	Wt.	%
Hydrochloric Acid, kg	0.00	0.00%
Potassium Borate?, kg	0.00	0.00%
Paladium catalyst,kg	0.00	0.00%
Water, kg	86.93	2.77%
Acetonitrile,kg	0.01	0.00%
4-Chloro (Compound 1)	0.00	0.00%
SEM-Cl (compound 2)	0.00	0.00%
Ethyl Acetate, kg	0.00	0.00%
NaOH, kg	0.00	0.00%
Charcoal	0.00	0.00%
Celite	0.00	0.00%
Dimethylacetamide DMAC	0.00	0.00%
Sodium Hydride,60%	0.00	0.00%
Sodium Chloride, kg	0.00	0.00%
WPT1710-225	0.00	0.00%
Tetrahydrofuran,kg	0.00	0.00%
INCB032304, Comp 5	0.00	0.00%
INCB032304*Phosphate	0.00	0.00%
Sodium Phosphate	0.00	0.00%
Pinacol,kg	0.00	0.00%
Acetaldehyde, kg	0.00	0.00%
Ethanol	0.00	0.00%
Methanol	299.39	9.53%
Potassium Chloride,kg	0.00	0.00%
paraformaldehyde,kg	0.00	0.00%
DBU*HCl	0.00	0.00%
Carbon Dioxide,kg	0.00	0.00%
DBU	0.00	0.00%
INCB032181, Comp 8	2.05	0.07%
INCB032309, Comp 9	0.00	0.00%
INCB032306, Comp 10R	0.00	0.00%
TBME,kg	2753.11	87.64%
Heptane,kg	0.00	0.00%
Cesium Chloride, kg	0.00	0.00%
Isopropanol,kg	0.00	0.00%
Lithium Tetrafluoroborate	0.00	0.00%
Sodium Bicarbonate,kg	0.00	0.00%
Ammonium hydroxide,kg	0.00	0.00%
Cesium Carbonate,kg	0.00	0.00%
INCB018424, Comp 11	0.00	0.00%
INCB021499,kg	0.00	0.00%
85% Phosphoric acid,kg	0.00	0.00%
INCB018424 Phosphate	0.00	0.00%
Trimethylsilylethanol,kg	0.00	0.00%
Hydrogen	0.00	0.00%
pyrimidine sodium	0.00	0.00%
DCM, methylene chloride	0.00	0.00%
DME, Dimethoxyethane	0.00	0.00%
Mineral Oil	0.00	0.00%
Total Weight per Batch,kg	3141.49	100.00%
Stream Density, kg/L	0.75	
Total Volume, L	4188.04	
Total Volume, Gal	1106.48	

ACC-342.3 Aqueous

Chemical	Wt.	%
Hydrochloric Acid, kg	0.00	0.00%
Potassium Borate?, kg	0.00	0.00%
Paladium catalyst,kg	0.00	0.00%
Water, kg	3859.53	81.02%
Acetonitrile,kg	196.45	4.12%
4-Chloro (Compound 1)	0.00	0.00%
SEM-Cl (compound 2)	0.00	0.00%
Ethyl Acetate, kg	0.00	0.00%
NaOH, kg	0.00	0.00%
Charcoal	0.00	0.00%
Celite	0.00	0.00%
Dimethylacetamide DMAC	0.00	0.00%
Sodium Hydride,60%	0.00	0.00%
Sodium Chloride, kg	215.88	4.53%
WPT1710-225	0.00	0.00%
Tetrahydrofuran,kg	0.00	0.00%
INCB032304, Comp 5	0.63	0.01%
INCB032304*Phosphate	0.00	0.00%
Sodium Phosphate	0.00	0.00%
Pinacol,kg	0.00	0.00%
Acetaldehyde, kg	0.00	0.00%
Ethanol	0.00	0.00%
Methanol	0.00	0.00%
Potassium Chloride,kg	0.00	0.00%
paraformaldehyde,kg	0.00	0.00%
DBU*HCl	0.00	0.00%
Carbon Dioxide,kg	0.00	0.00%
DBU	114.64	2.41%
INCB032181, Comp 8	5.10	0.11%
INCB032309, Comp 9	13.43	0.28%
INCB032306, Comp 10R	0.00	0.00%
TBME,kg	334.52	7.02%
Heptane,kg	0.00	0.00%
Cesium Chloride, kg	0.00	0.00%
Isopropanol,kg	0.00	0.00%
Lithium Tetrafluoroborate	0.00	0.00%
Sodium Bicarbonate,kg	23.45	0.49%
Ammonium hydroxide,kg	0.00	0.00%
Cesium Carbonate,kg	0.00	0.00%
INCB018424, Comp 11	0.00	0.00%
INCB021499,kg	0.00	0.00%
85% Phosphoric acid,kg	0.00	0.00%
INCB018424 Phosphate	0.00	0.00%
Trimethylsilylethanol,kg	0.00	0.00%
Hydrogen	0.00	0.00%
pyrimidine sodium	0.00	0.00%
DCM, methylene chloride	0.00	0.00%
DME, Dimethoxyethane	0.00	0.00%
Mineral Oil	0.00	0.00%
Total Weight per Batch,kg	4763.63	100.00%
Stream Density, kg/L	0.99	
Total Volume, L	4805.78	
Total Volume, Gal	1269.69	

Ampac Fine Chemicals
Combined Heat and Power Project
Hazardous Solvent and Aqueous Streams

ACC-342.4 Solvent

Chemical	Wt.	%
INCB032183, WPT1710-212	0.00	0.00%
INCB032182, Comp 3	0.00	0.00%
Potassium Carbonate,kg	0.00	0.00%
1-Butanol,kg	0.00	0.00%
Hydrochloric Acid, kg	0.00	0.00%
Potassium Borate?, kg	0.00	0.00%
Paladium catalyst,kg	0.00	0.00%
Water, kg	40.80	0.39%
Acetonitrile,kg	2263.27	21.41%
4-Chloro (Compound 1)	0.00	0.00%
SEM-Cl (compound 2)	0.00	0.00%
Ethyl Acetate, kg	2611.45	24.70%
NaOH, kg	0.00	0.00%
Charcoal	0.00	0.00%
Celite	0.00	0.00%
Dimethylacetamide DMAC	0.00	0.00%
Sodium Hydride,60%	0.00	0.00%
Sodium Chloride, kg	0.00	0.00%
WPT1710-225	0.00	0.00%
Tetrahydrofuran,kg	0.00	0.00%
INCB032304, Comp 5	0.00	0.00%
INCB032304*Phosphate	0.00	0.00%
Sodium Phosphate	0.00	0.00%
Pinacol,kg	0.00	0.00%
Acetaldehyde, kg	0.00	0.00%
Ethanol	0.00	0.00%
Methanol	0.00	0.00%
Potassium Chloride,kg	0.00	0.00%
paraformaldehyde,kg	0.00	0.00%
DBU*HCl	0.00	0.00%
Carbon Dioxide,kg	0.00	0.00%
DBU	0.00	0.00%
INCB032181, Comp 8	1.36	0.01%
INCB032309, Comp 9	0.00	0.00%
INCB032305, Comp 10S	0.00	0.00%
TBME,kg	0.00	0.00%
Heptane,kg	3446.67	32.60%
Isopropanol,kg	2207.45	20.88%
Boron Trifluoride	0.00	0.00%
Diethylether	0.00	0.00%
Sodium Bicarbonate,kg	0.00	0.00%
Ammonium hydroxide,kg	0.00	0.00%
INCB018424, Comp 11	0.00	0.00%
INCB021499,kg	0.00	0.00%
85% Phosphoric acid,kg	0.00	0.00%
INCB018424 Phosphate	0.00	0.00%
Vinyltrimethylsilylane,kg	0.00	0.00%
Trimethylsilylethanol,kg	0.00	0.00%
Fluoroboric acid	0.00	0.00%
Boric acid	0.00	0.00%
Ammonium tetrafluoroboride	0.00	0.00%
Hydrogen	0.00	0.00%
pyrimidine sodium	0.00	0.00%
DCM, methylene chloride	0.00	0.00%
DME, Dimethoxyethane	0.00	0.00%
Mineral Oil	0.00	0.00%
Total Weight per Batch,kg	10571.01	100.00%
Stream Density, kg/L	0.77	
Total Volume, L	13716.01	
Total Volume, Gal	3623.78	

ACC-342.4 Aqueous

Chemical	Wt.	%
INCB032183, WPT1710-212	0.00	0.00%
INCB032182, Comp 3	0.00	0.00%
Potassium Carbonate,kg	0.00	0.00%
1-Butanol,kg	0.00	0.00%
Hydrochloric Acid, kg	0.00	0.00%
Potassium Borate?, kg	0.00	0.00%
Paladium catalyst,kg	0.00	0.00%
Water, kg	4167.42	79.79%
Acetonitrile,kg	341.73	6.54%
4-Chloro (Compound 1)	0.00	0.00%
SEM-Cl (compound 2)	0.00	0.00%
Ethyl Acetate, kg	180.61	3.46%
NaOH, kg	0.00	0.00%
Charcoal	0.00	0.00%
Celite	0.00	0.00%
Dimethylacetamide DMAC	0.00	0.00%
Sodium Hydride,60%	0.00	0.00%
Sodium Chloride, kg	386.19	7.39%
WPT1710-225	0.00	0.00%
Tetrahydrofuran,kg	0.00	0.00%
INCB032304, Comp 5	0.00	0.00%
INCB032304*Phosphate	0.00	0.00%
Sodium Phosphate	0.00	0.00%
Pinacol,kg	0.00	0.00%
Acetaldehyde, kg	0.00	0.00%
Ethanol	0.00	0.00%
Methanol	0.00	0.00%
Potassium Chloride,kg	0.00	0.00%
paraformaldehyde,kg	0.00	0.00%
DBU*HCl	0.00	0.00%
Carbon Dioxide,kg	0.00	0.00%
DBU	96.25	1.84%
INCB032181, Comp 8	0.94	0.02%
INCB032309, Comp 9	28.98	0.55%
INCB032305, Comp 10S	0.02	0.00%
TBME,kg	0.00	0.00%
Heptane,kg	0.00	0.00%
Isopropanol,kg	0.00	0.00%
Boron Trifluoride	0.00	0.00%
Diethylether	0.00	0.00%
Sodium Bicarbonate,kg	20.81	0.40%
Ammonium hydroxide,kg	0.00	0.00%
INCB018424, Comp 11	0.00	0.00%
INCB021499,kg	0.00	0.00%
85% Phosphoric acid,kg	0.00	0.00%
INCB018424 Phosphate	0.00	0.00%
Vinyltrimethylsilylane,kg	0.00	0.00%
Trimethylsilylethanol,kg	0.00	0.00%
Fluoroboric acid	0.00	0.00%
Boric acid	0.00	0.00%
Ammonium tetrafluoroboride	0.00	0.00%
Hydrogen	0.00	0.00%
pyrimidine sodium	0.00	0.00%
DCM, methylene chloride	0.00	0.00%
DME, Dimethoxyethane	0.00	0.00%
Mineral Oil	0.00	0.00%
Total Weight per Batch,kg	5222.95	100.00%
Stream Density, kg/L	1.02	
Total Volume, L	5117.85	
Total Volume, Gal	1352.14	

Ampac Fine Chemicals
Combined Heat and Power Project
Hazardous Solvent and Aqueous Streams

ACC-341/343 Solvent

Chemical	Wt.	%
MTBE	199.2	100.0%
Total Weight per Batch, kg	199.2	100.0%
Stream Density, kg/L	0.75	
Total Volume, L	265.6	
Total Volume, Gal	70.2	

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NOTES

Mass balance does not account for cleaning or CSP regeneration, etc…
No aqueous waste streams produced by this process

Ampac Fine Chemicals
Combined Heat and Power Project
Hazardous Solvent and Aqueous Streams

ACC-340.1 Solvent

Chemical	Wt.	%
Water, kg	201.40	3.29%
Acetonitrile,kg	1836.50	30.02%
4-Chloro (Compound 1)	0.00	0.00%
SEM-Cl (compound 2)	0.00	0.00%
Ethyl Acetate, kg	2142.82	35.03%
NaOH, kg	0.00	0.00%
Charcoal	0.00	0.00%
Celite	0.00	0.00%
Dimethylacetamide DMAC	0.00	0.00%
Sodium Hydride,60%	0.00	0.00%
Sodium Chloride, kg	0.00	0.00%
WPT1710-225	0.00	0.00%
Tetrahydrofuran,kg	0.00	0.00%
INCB032304, Comp 5	0.00	0.00%
INCB032304*Phosphate	0.00	0.00%
Sodium Phosphate	0.00	0.00%
Pinacol,kg	0.00	0.00%
Acetaldehyde, kg	0.00	0.00%
Ethanol	0.00	0.00%
Methanol	0.00	0.00%
Potassium Chloride,kg	0.00	0.00%
paraformaldehyde,kg	0.13	0.00%
DBU*HCl	0.00	0.00%
Carbon Dioxide,kg	0.00	0.00%
DBU	0.00	0.00%
INCB032181, Comp 8	0.00	0.00%
INCB032309, Comp 9	0.00	0.00%
INCB032306, Comp 10R	0.00	0.00%
TBME,kg	837.80	13.70%
Heptane,kg	0.00	0.00%
Cesium Chloride, kg	0.00	0.00%
Isopropanol,kg	1072.38	17.53%
Boron Trifluoride	0.00	0.00%
Sodium Bicarbonate,kg	0.00	0.00%
Ammonium hydroxide,kg	8.77	0.14%
Cesium Carbonate,kg	0.00	0.00%
INCB018424, Comp 11	0.00	0.00%
INCB021499,kg	0.00	0.00%
85% Phosphoric acid,kg	0.00	0.00%
INCB018424 Phosphate	0.00	0.00%
Trimethylsilylethanol,kg	17.11	0.28%
Hydrogen	0.00	0.00%
pyrimidine sodium	0.00	0.00%
DCM, methylene chloride	0.00	0.00%
DME, Dimethoxyethane	0.00	0.00%
Mineral Oil	0.00	0.00%
Total Weight per Batch,kg	6116.91	100.00%
Stream Density, kg/L	0.82	
Total Volume, L	7457.61	
Total Volume, Gal	1970.31	

ACC-340.1 Aqueous

Chemical	Wt.	%
Water, kg	1842.15	81.86%
Acetonitrile,kg	0.00	0.00%
4-Chloro (Compound 1)	0.00	0.00%
SEM-Cl (compound 2)	0.00	0.00%
Ethyl Acetate, kg	160.27	7.12%
NaOH, kg	0.00	0.00%
Charcoal	0.00	0.00%
Celite	0.00	0.00%
Dimethylacetamide DMAC	0.00	0.00%
Sodium Hydride,60%	0.00	0.00%
Sodium Chloride, kg	125.19	5.56%
WPT1710-225	0.00	0.00%
Tetrahydrofuran,kg	0.00	0.00%
INCB032304, Comp 5	0.00	0.00%
INCB032304*Phosphate	0.00	0.00%
Sodium Phosphate	0.00	0.00%
Pinacol,kg	0.00	0.00%
Acetaldehyde, kg	0.00	0.00%
Ethanol	0.00	0.00%
Methanol	0.00	0.00%
Potassium Chloride,kg	0.00	0.00%
paraformaldehyde,kg	2.19	0.10%
DBU*HCl	0.00	0.00%
Carbon Dioxide,kg	0.00	0.00%
DBU	0.00	0.00%
INCB032181, Comp 8	0.00	0.00%
INCB032309, Comp 9	0.00	0.00%
INCB032306, Comp 10R	0.01	0.00%
TBME,kg	0.00	0.00%
Heptane,kg	0.00	0.00%
Cesium Chloride, kg	0.00	0.00%
Isopropanol,kg	0.00	0.00%
Boron Trifluoride	18.69	0.83%
Sodium Bicarbonate,kg	96.46	4.29%
Ammonium hydroxide,kg	0.00	0.00%
Cesium Carbonate,kg	0.00	0.00%
INCB018424, Comp 11	2.80	0.12%
INCB021499,kg	0.00	0.00%
85% Phosphoric acid,kg	0.00	0.00%
INCB018424 Phosphate	0.00	0.00%
Trimethylsilylethanol,kg	2.58	0.11%
Hydrogen	0.00	0.00%
pyrimidine sodium	0.00	0.00%
DCM, methylene chloride	0.00	0.00%
DME, Dimethoxyethane	0.00	0.00%
Mineral Oil	0.00	0.00%
Total Weight per Batch,kg	2250.35	100.00%
Stream Density, kg/L	1.05	
Total Volume, L	2152.10	
Total Volume, Gal	568.59	

Ampac Fine Chemicals
Combined Heat and Power Project
Hazardous Solvent and Aqueous Streams

ACC-340.2 Solvent

Chemical	Wt.	%
Water, kg	4.99	0.13%
Acetonitrile,kg	0.00	0.00%
4-Chloro (Compound 1)	0.00	0.00%
SEM-Cl (compound 2)	0.00	0.00%
Ethyl Acetate, kg	0.00	0.00%
NaOH, kg	0.00	0.00%
Charcoal	0.00	0.00%
Celite	0.00	0.00%
Dimethylacetamide DMAC	0.00	0.00%
Sodium Hydride,60%	0.00	0.00%
Sodium Chloride, kg	0.00	0.00%
WPT1710-225	0.00	0.00%
Tetrahydrofuran,kg	0.00	0.00%
INCB032304, Comp 5	0.00	0.00%
INCB032304*Phosphate	0.00	0.00%
Sodium Phosphate	0.00	0.00%
Pinacol,kg	0.00	0.00%
Acetaldehyde, kg	0.00	0.00%
Ethanol	0.00	0.00%
Methanol	0.00	0.00%
Potassium Chloride,kg	0.00	0.00%
paraformaldehyde,kg	0.00	0.00%
DBU*HCl	0.00	0.00%
Carbon Dioxide,kg	0.00	0.00%
DBU	0.00	0.00%
INCB032181, Comp 8	0.00	0.00%
INCB032309, Comp 9	0.00	0.00%
INCB032306, Comp 10R	0.00	0.00%
TBME,kg	0.00	0.00%
Heptane,kg	361.03	9.54%
Cesium Chloride, kg	0.00	0.00%
Isopropanol,kg	835.45	22.08%
Lithium Tetrafluoroborate	0.00	0.00%
Sodium Bicarbonate,kg	0.00	0.00%
Ammonium hydroxide,kg	0.00	0.00%
Cesium Carbonate,kg	0.00	0.00%
INCB018424, Comp 11	0.00	0.00%
INCB021499,kg	0.00	0.00%
85% Phosphoric acid,kg	0.00	0.00%
INCB018424 Phosphate	0.00	0.00%
Trimethylsilylethanol,kg	0.00	0.00%
Hydrogen	0.00	0.00%
pyrimidine sodium	0.00	0.00%
DCM, methylene chloride	2582.07	68.24%
DME, Dimethoxyethane	0.00	0.00%
Mineral Oil	0.00	0.00%
Total Weight per Batch,kg	3783.54	100.00%
Stream Density, kg/L	1.06	
Total Volume, L	3556.30	
Total Volume, Gal	939.58	

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NOTES

Mass balance does not account for cleaning
No aqueous waste streams produced by this process

Ampac Fine Chemicals
Combined Heat and Power Project
Hazardous Solvent and Aqueous Streams

ACC-340 Solvent

Chemical	Wt.	%
Water, kg	0.00	0.0%
Acetonitrile,kg	0.00	0.0%
4-Chloro (Compound 1)	0.00	0.0%
SEM-Cl (compound 2)	0.00	0.0%
Ethyl Acetate, kg	0.00	0.0%
NaOH, kg	0.00	0.0%
Charcoal	0.00	0.0%
Celite	0.00	0.0%
Dimethylacetamide DMAC	0.00	0.0%
Sodium Hydride,60%	0.00	0.0%
Sodium Chloride, kg	0.00	0.0%
WPT1710-225	0.00	0.0%
Tetrahydrofuran,kg	0.00	0.0%
INCB032304, Comp 5	0.00	0.0%
INCB032304*Phosphate	0.00	0.0%
Sodium Phosphate	0.00	0.0%
Pinacol,kg	0.00	0.0%
Acetaldehyde, kg	0.00	0.0%
Ethanol	0.00	0.0%
Methanol	1166.52	30.4%
Potassium Chloride,kg	0.00	0.0%
paraformaldehyde,kg	0.00	0.0%
DBU*HCl	0.00	0.0%
Carbon Dioxide,kg	0.00	0.0%
DBU	0.00	0.0%
INCB032181, Comp 8	0.00	0.0%
INCB032309, Comp 9	0.00	0.0%
INCB032306, Comp 10R	0.00	0.0%
TBME,kg	0.00	0.0%
Heptane,kg	2003.78	52.2%
Cesium Chloride, kg	0.00	0.0%
Isopropanol,kg	666.02	17.4%
Lithium Tetrafluoroborate	0.00	0.0%
Sodium Bicarbonate,kg	0.00	0.0%
Ammonium hydroxide,kg	0.00	0.0%
Cesium Carbonate,kg	0.00	0.0%
INCB018424, Comp 11	0.00	0.0%
INCB021499,kg	0.00	0.0%
85% Phosphoric acid,kg	0.00	0.0%
INCB018424 Phosphate	0.00	0.0%
Trimethylsilylethanol,kg	0.00	0.0%
Hydrogen	0.00	0.0%
pyrimidine sodium	0.00	0.0%
DCM, methylene chloride	0.19	0.0%
DME, Dimethoxyethane	0.00	0.0%
Mineral Oil	0.00	0.0%
Total Weight per Batch,kg	3836.51	100.0%
Stream Density, kg/L	0.73	
Total Volume, L	5270.06	
Total Volume, Gal	1392.35	

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NOTES

Mass balance does not account for cleaning
No aqueous waste streams produced by this process

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